

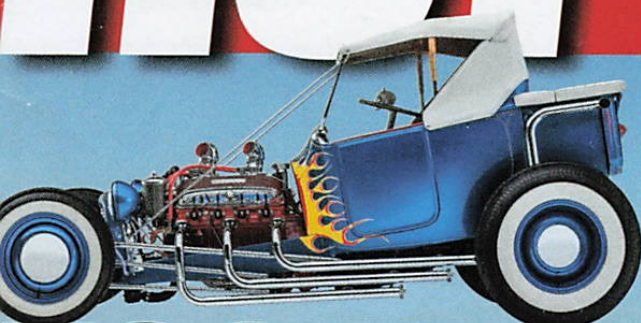


LARRY LARSON'S NO PREP CADILLAC ATS-V



PRO-LINE
RACING 481X
572CI CHEVY
PUMPING OUT
3,000 HP PLUS!

HOT ROD



KOOKIE

NORM GRABOWSKI'S ICONIC T-BUCKET
WAS ON OUR COVER 65 YEARS AGO.
NOW IT'S BEEN RESTORED AND IS BACK AGAIN



HOW TO
DIAGNOSE
IGNITION
PROBLEMS

INSIDE A 440-INCH
LSX TORQUE MONSTER
BUILD AN E85-READY FUEL SYSTEM
PERFORMANCE COILS EXPLAINED
INTAKE MANIFOLD COMPARISON

TEN: PUBLISHING

HOTROD.COM EVERY DAY // OCTOBER 2020

HOT ROD WHERE IT ALL BEGAN

Holley TERMINATORTM X

STEALTH 4150

**SUPPORTS UP TO 650 HP
NATURALLY ASPIRATED &
1250 HP FORCED INDUCTION!**

- Take complete control of your engine without breaking the bank!
- Features Holley's self-learning fuel strategies; you don't have to be a computer/tuning wiz to have EFI!
- X Max systems include electronic trans control for GM 4L60/80, Ford AODE & 4R70W
- Timed spark port for vacuum advanced distributors located under the front fuel bowl for easy access to the distributor
- On-board diagnostic LEDs allow for identification of critical engine issues at a glance
- Boost control & nitrous control included (progressive & non-progressive)

ALSO AVAILABLE IN BLACK & SHINY FINISHES!

Holley
TERMINATORTM X & XMAX

ALSO AVAILABLE! PLUG & PLAY MPFI KITS FOR MOST DOMESTIC V8 ENGINES INCLUDING GM LS, GEN III HEMI, FORD COYOTE & MOD MOTOR!

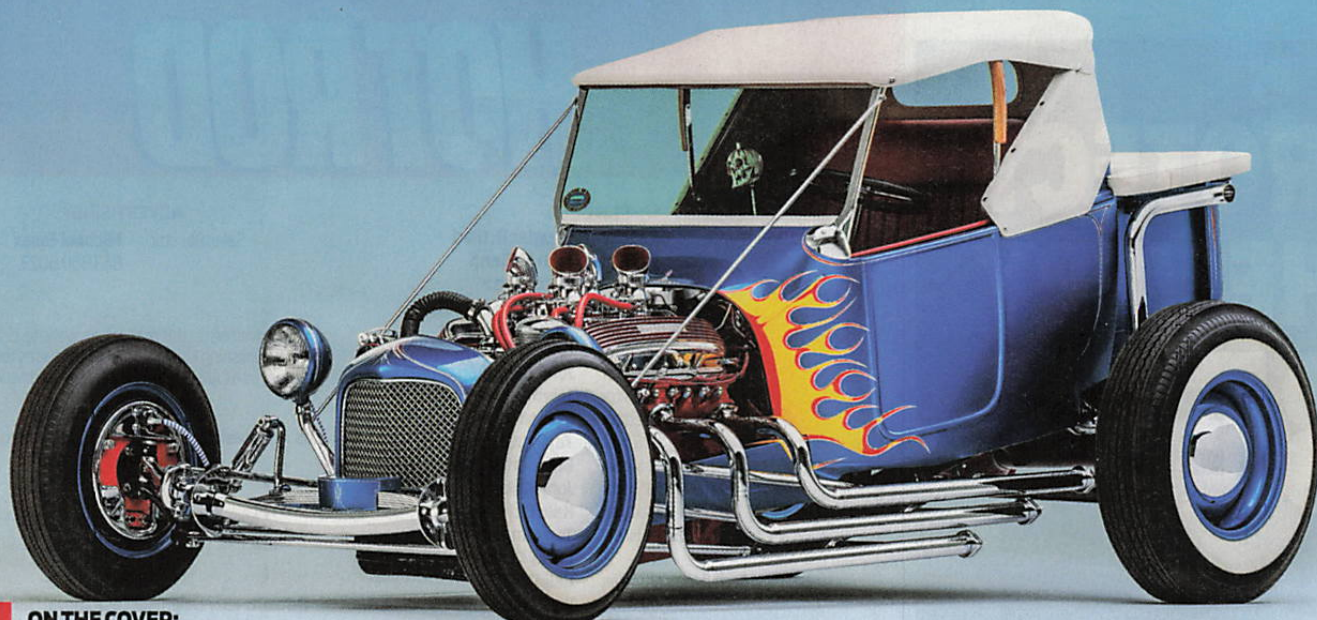
Holley **EFI** PRO DASH DISPLAYS

**NOW AVAILABLE IN STAND ALONE VERSIONS!
WILL WORK IN ALMOST ANY VEHICLE!
NO ECU OR EFI REQUIRED!**

- Real-time ECU tuning on the fly for Dominator & HP ECUs!
No laptop required!
- A great plug & play addition to your Dominator, HP, Terminator X, or Sniper EFI system
- Swipe between multiple active screens (tune, warm-up, race, drive, etc.), thanks to capacitive touch design!
- Built in GPS speedo with odometer function (antenna included)
- Capable of monitoring up to 238 real-time values such as RPM/TPS/Boost/etc.
- On-screen data-log playback feature allows for immediate run review
- **Protect your investment!** Both dashes include racer definable channel alarms & warnings.



WWW.HOLLEY.COM | 866-464-6553



12 **ON THE COVER:**
Norm Grabowski's Kookie T restored by Roy Brizio Street Rods. Photo by Jorge Nuñez



32



24

Contents

- 06** Starting Line with John McGann
- 08** Where It All Began: Stu Hilborn
- 10** HOT ROD 20, 40, and 60 Years Ago
- 12** Kookie T: The First and Favorite T-Bucket
- 24** Larry Larson's *No Prep Kings* ATS-V
- 32** Stan Johnson's R-Code Galaxie
- 40** Homeless Hemi, Part 4: Intake Manifold
- 44** Project Track Rat Gets LS Torque Monster
- 50** Drift Truck Project: 1,200HP From E85 Fuel

- 54** Quick Tech With Marlan Davis
- 58** Reader's Tech Q&A
- 66** New Life for Old Guages
- 82** In the Words of Freiburger...



08

PROTECT THE VERY BEST

FloorLiner™

Laser-measured to protect
high-performance vehicles

WeatherTech®

Auto. Home. Pet. Find Your Fit.

1-800-441-6287

1-630-769-1500



Made in USA

© 2020 MacNeil IP LLC

HOT ROD

EDITORIAL

Performance Group Director
Editor-in-Chief
Managing Editor/
Ad Coordinator
Features Editor
Senior Technical Editor
Technical Editor
Technical Editor
Technical Editor
Staff Editor
Director, Social Media
Social Media Editor
Video Producer
HOT ROD Garage Hosts

Tech Center Manager
Contributors

Douglas R. Glad
John McGann
Rusty Kurtz

Timothy Bernsau
Marlan Davis
John Gilbert
Johnny Hunkins
Steven Rupp
Taylor Kempkes
Brandon Scarpelli
John Roberts
Kale Eickhof
Tony Angelo
Lucky Costa
Callin Head

Wes Allison, Brian
Brennan, Eric English,
Mark Gearhart, Richard
Holdener, Robert
McGaffin, Jorge Nuñez,
Mark Sanchez, Chris
Shelton, Tim Sutton,
Arvid Svendsen

ART DIRECTION & DESIGN
Design Director **Markas Platt**

ON THE WEB

HOTROD.com
SuperChevy.com
Mustang360.com
MotorTrendOnDemand.com

SUBSCRIPTION SERVICES

Email hotrodmagazine@emailcustomerservice.com, call **800/800-4681** (386.447.6385 international), or write to Hot Rod, P.O. Box 420235, Palm Coast, FL 32142-0235. Please include name, address, and phone number on any inquiries. For change of address, six weeks notice required. Send old as well as new address to HOT ROD, P.O. Box 420235, Palm Coast, FL 32142-0235.

Occasionally our subscriber list is made available to reputable firms offering goods and services we believe would be of interest to our readers. If you prefer to be excluded, please send your current address label and a note requesting to be excluded from these promotions to TEN: Publishing Media, LLC, 831 S. Douglas St., El Segundo, CA 90245, Attn: Privacy Coordinator.

ADVERTISING INFORMATION

Please call HOT ROD Advertising Department at 949.705.3191. Related publications include *Four Wheeler* and *MotorTrend*.

Reprints: For high-quality custom reprints and eprints, please contact The YGS Group at 800.290.5460 or TENreprints@theygsgroup.com.

Back issues: To order back issues, visit TENbackissues.com.

Any submissions or contributions from readers shall be subject to and governed by TEN: Publishing Media's User Content Submission Terms and Conditions, which are posted at <http://enthusiastnetwork.com/submissions/>.

ADVERTISING

Sales Director **Michael Essex**
863.860.6023

To advertise on this magazine's website, or any of TEN: Publishing Media's other enthusiast sites, please contact us at AM-advertising@enthusiastnetwork.com

WEST & SOUTHWEST

Los Angeles: 831 S. Douglas St., El Segundo, CA 90245;
Cody Busch 657.294.6509

EAST

New York: 1180 6th Avenue, 9th Floor
New York, NY 10036; Jim Keplesky, 212.915.4413

NORTH

Detroit: 4327 Delemere Court, Royal Oak, MI 48073;
Joe Didato, 248.594.2542

SOUTHEAST

John Viscardo, 813.777.4489

TEN: PUBLISHING MEDIA, LLC

President **Kevin Mullan**
Senior Director, Finance **Catherine Temkin**
Director, Publishing Services **Matthew Paige**

CONSUMER MARKETING, ENTHUSIAST MEDIA SUBSCRIPTION COMPANY, INC.

Senior Director,
Retention Marketing &
Operations Fulfillment **Jennifer Buescher**
Director, Online, Digital &
Email Marketing **Christy Check**
Director, Planning &
Financial Analysis **Piotr Karwowski**
Senior Manager,
Database Marketing **Dan Buckman**
Manager,
Print Order Analyst **Helene Christensen**

MOTORTREND GROUP

President/General Manager **Alex Wellen**
Group SVP, Sales **Eric Schwab**
Head of Editorial **Edward Loh**
Head of Operations **Jerry Solomon**
Head of International &
Business Development **Francis Keeling**
Head of Product & Design **Pepper Chlavacchi**
SVP, Digital Media Sales **Jason Rice**
VP, Sales **Matt Bolce**
Auto Aftermarket **Ryan Payne**
SVP, Marketing **David Freiburger**
SVP, Content **Shilpa Joshi**
Strategy Aftermarket **Megan Neal**
VP, Finance/Controller
VP, Social Media &
Content Monetization

TEN: PUBLISHING

Copyright 2020 by
TEN: Publishing Media, LLC.

ALL RIGHTS RESERVED PRINTED IN THE USA

The HOT ROD trademark is a registered trademark of Motor Trend Group, LLC.
Under license by TEN: Publishing Media, LLC.

TIRE RACK
.com

HOT ROD



Bad to the Bone

Full tang stainless steel blade with natural bone handle —now **ONLY \$79!**

The very best hunting knives possess a perfect balance of form and function. They're carefully constructed from fine materials, but also have that little something extra to connect the owner with nature.

If you're on the hunt for a knife that combines impeccable craftsmanship with a sense of wonder, the **\$79 Huntsman Blade** is the trophy you're looking for.

The blade is full tang, meaning it doesn't stop at the handle but extends to the length of the grip for the ultimate in strength. The blade is made from 420 surgical steel, famed for its sharpness and its resistance to corrosion.

The handle is made from genuine natural bone, and features decorative wood spacers and a hand-carved motif of two overlapping feathers—a reminder for you to respect and connect with the natural world.

This fusion of substance and style can garner a high price tag out in the marketplace. In fact, we found full tang, stainless steel blades with bone handles in excess of \$2,000. Well, that won't cut it around here. We have mastered the hunt for the best deal, and in turn pass the spoils on to our customers.

But we don't stop there. While supplies last, we'll include a pair of \$99 8x21 power compact binoculars *and* a genuine leather sheath **FREE** when you purchase the **Huntsman Blade**.

Your satisfaction is 100% guaranteed. Feel the knife in your hands, wear it on your hip, inspect the impeccable craftsmanship. If you don't feel like we cut you a fair deal, send it back within 30 days for a complete refund of the item price.

Limited Reserves. A deal like this won't last long. We have only 1120 **Huntsman Blades** for this ad only. Don't let this beauty slip through your fingers. Call today!

Huntsman Blade \$249*

Offer Code Price Only \$79 + S&P Save \$170

1-800-333-2045

Your Insider Offer Code: HUK203-01

You must use the insider offer code to get our special price.

Stauer® 14101 Southcross Drive W., Ste 155, Dept. HUK203-01
Burnsville, Minnesota 55337 www.stauer.com

*Discount is only for customers who use the offer code versus the listed original Stauer.com price.

California residents please call 1-800-333-2045 regarding Proposition 65 regulations before purchasing this product.

- 12" overall length; 6 1/2" stainless steel full tang blade • Genuine bone handle with brass hand guard & bolsters • Includes genuine leather sheath

Stauer... *Afford the Extraordinary.®*

**EXCLUSIVE
FREE**

Stauer® 8x21
Compact
Binoculars
—a \$99 value—
with purchase of
Huntsman Blade



BONUS! Call today and you'll also receive this genuine leather sheath!

What Stauer Clients Are Saying About Our Knives



"This knife is beautiful!"

— J., La Crescent, MN

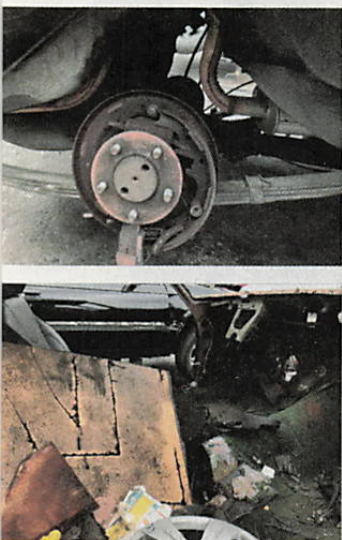


"The feel of this knife is unbelievable...this is an incredibly fine instrument."

— H., Arvada, CO



Rating of A+



THE JUNKYARD CIRCLE OF LIFE

Though the notion is strange to my non-car-enthusiast friends, HOT ROD readers will appreciate this—I like to go to junkyards, whether or not I'm actually looking for a specific part. There are a number of reasons why. First, it's a good way to spend a couple hours on a weekend. Second, walking the aisles in a big junkyard is pretty good exercise, though I don't suspect any fitness gurus will be making any workout videos in this particular setting. Third, and the main reason why I like going, is that you never know what you'll find there.

By John McGann

Editor-in-Chief
@john.mcgann

Yes, the self-service junkyards can be a great learning experience. Seeing cars in various states of disassembly, laid bare in front of you, shows the inner workings of all kinds of systems, from relatively complex overhead-cam drive and actuation assemblies, to four-wheel and all-wheel-drive systems, hydraulic line routing, fluid coolers, seat heaters, and lighting groups. It's cool when you come across something especially interesting like the mechanical four-wheel-steering system in a late-80's Honda Prelude Si; or a GMC pickup with QuadraSteer, GM's electronically-controlled version available on 2002-2005 pickups.

Usually, I am searching for something specific, and I've been mining our local establishments for GMT400 pickup parts, of which there are plenty. I've nabbed a decent tailgate, complete dashboard, some emissions hoses, and a small assortment of trim pieces. I almost grabbed a clutch-pedal assembly, but I didn't have the time and right tools with me the day I saw it. That truck was gone the next time I went just two days later, no doubt squished into a cube on its way to be melted down. That's how it goes—the thrill of victory, or the agony of defeat!

One sensation I don't expect to feel in a junkyard is mourning, but it happens. Look at the pictures of this 1970 Charger, a car I never thought I'd see in my regular haunts. What was left of it was so badly damaged, the antique and collector car junkyards didn't want it. B-body Mopars are among the most

desirable cars of the muscle car era, yet here this thing was, another rotting hulk, waiting its allotted time period in the yard before its inevitable date with the crusher. How sad. Being a sentimental person, I feel that way about almost all the cars I see there, if I pause to consider the arc of any car's life. They really are extensions of ourselves, and you can definitely tell which ones were owned by slobs, hoarders, and mechanical

hacks based on the amount of trash, food wrappers, and unpaid bills strewn about—and the number of Scotch Locks and wire nuts in the electrical system.

In the junkyards I frequent, you're usually seeing the results of neglect and apathy, but someone at some point in time cared a great deal about that car, even the most basic commuter vehicle. Someone at the manufacturer designed



it, or its myriad of individual components and subsystems; someone at an assembly plant provided for his or her family by putting that car together; a dealership employed salespeople, accountants, and service technicians because it was sold there; and there was at least one happy buyer—presumably the car's first owner who drove it off the lot. Considering the independence and livelihood cars afford us, they really are more than the sum of their parts. A friend of mine knows someone who owns an automotive salvage company and said that virtually all parts and components on a junked car are recycled, and one can take consolation in that. No matter what, the cars continue to provide.



Follow us
@hotrod magazine



No GPS. No problem.

INSURANCE DRIVERS CLUB CAR CULTURE MARKETPLACE

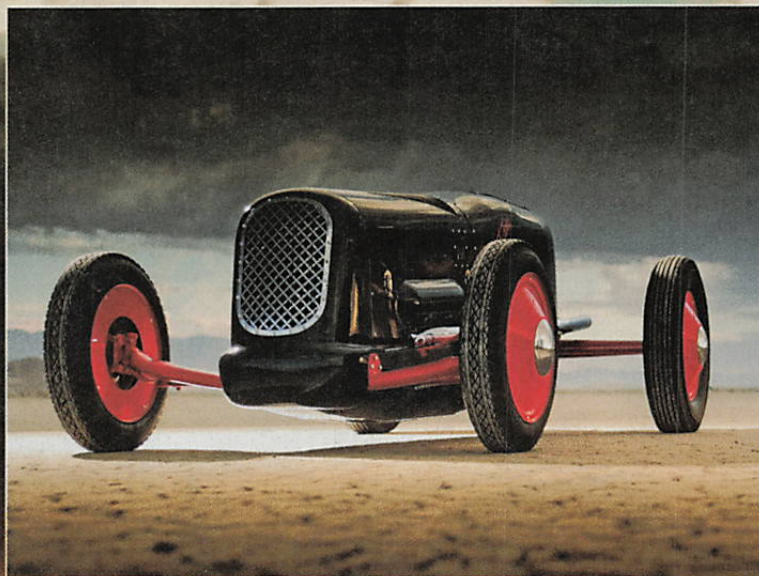
HAGERTY. | Insurance

877-922-4036 | Local agent | [Hagerty.com](https://www.hagerty.com)

Policies underwritten by Essentia Insurance Company. Membership by Hagerty Drivers Club (HDC), a non-insurance subsidiary of The Hagerty Group, LLC. Only the HDC Program Guide contains a complete description of benefits. Purchase of insurance not required for membership in HDC. All third party makes, models, and vehicle names are property of their respective owners. Their use is meant to reflect the authenticity of the vehicle and do not imply sponsorship nor endorsement of Hagerty nor any of these products or services. Hagerty is a registered trademark of the Hagerty Group LLC, ©2020 The Hagerty Group, LLC. All Rights Reserved.

THIS 150 MPH HOT ROD CHANGED HISTORY

✍️ Tim Bernsau & Chris Shelton 📷 Tim Sutton



Stu Hilborn (1917-2013) was one of the pioneers of hot rodding and the performance parts industry. He is best known for developing mechanical fuel-injection systems for race cars. Before he was famous, however, he was just a young hot rodder trying to go as fast as he could on the dry lakes of Southern California.

Several kinds of hot rods were racing on the lakes in the 1940s. Open-wheel cars with purpose-built custom streamlined bodies were classified as “streamliners” by the Southern California Timing Association (SCTA). Today, they are referred to as “lakesters.” Stu Hilborn’s streamliner was one of the best known, best looking, and most successful on the lakes—and served as Hilborn’s mule car for testing his fuel-injection technology. It was the first streamliner to run 150 mph—and it almost killed him.

Hilborn’s original car is long gone, but when Jim Lattin built this re-creation a few years ago, Chris Shelton and photographer Tim Sutton followed the story.

Stu Hilborn’s Streamliner

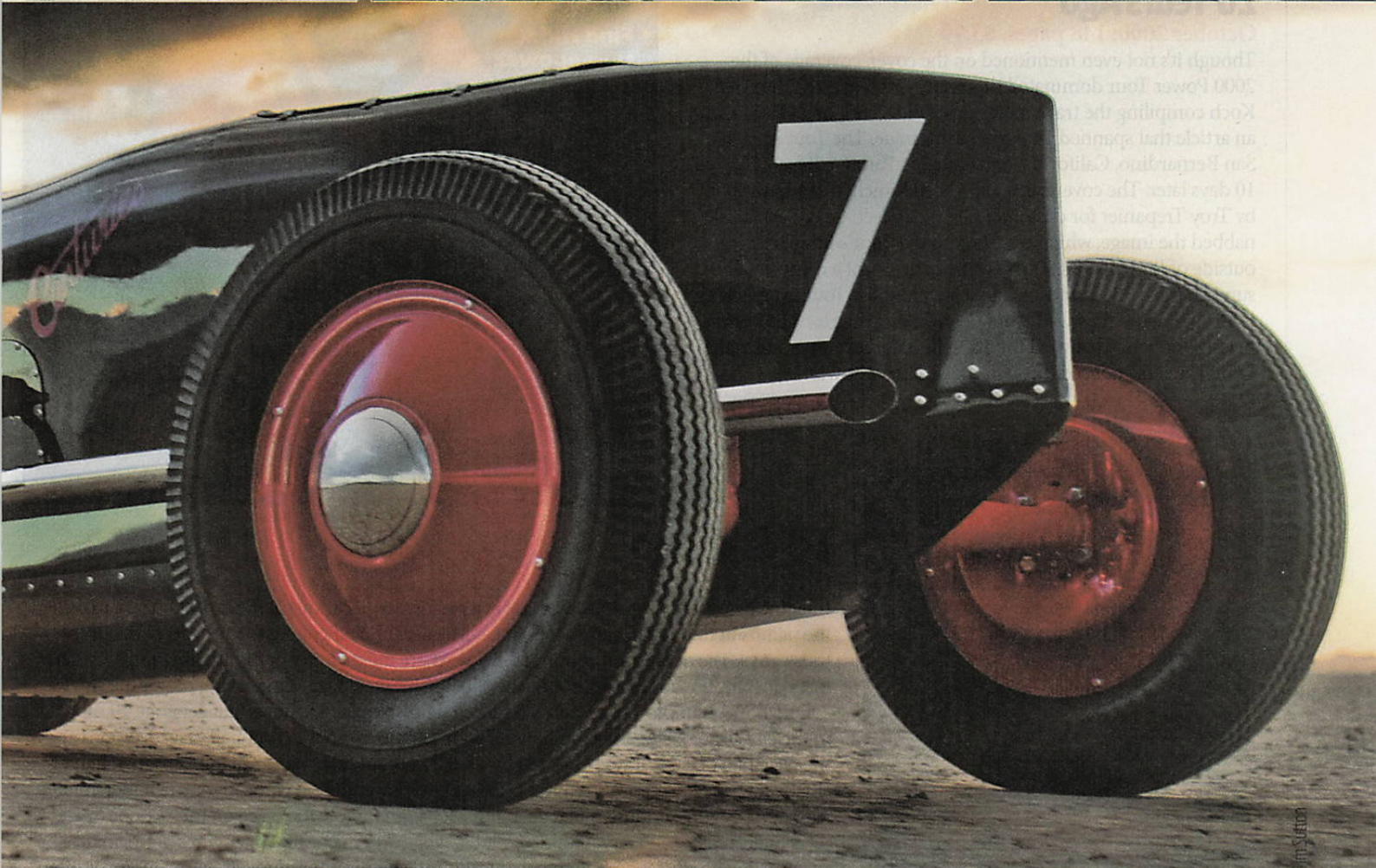
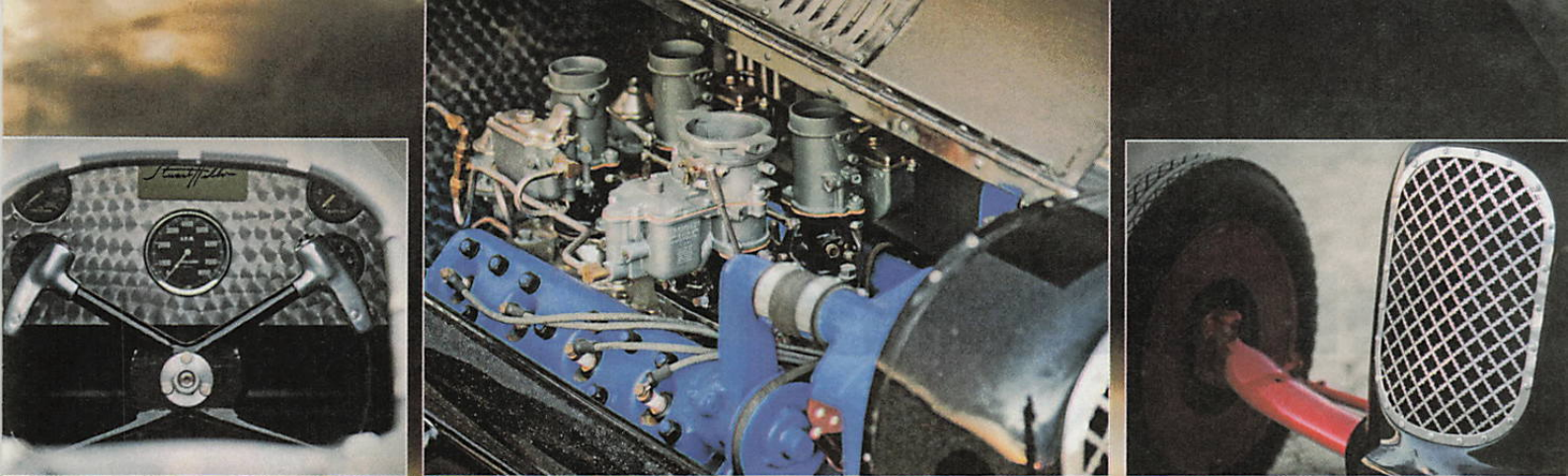
As is the case with most noteworthy historical race cars, Stu Hilborn’s

famous race car didn’t start life as Stu’s. Until Stu bought it on Dec. 7, 1941, it belonged to Bill Warth—in fact, it was Warth’s second car.

What Warth did was apply the ideas proven on his first car to his next. Rather than spanning a pair of 1924 Chevrolet framers with crossmembers, he welded a 1937 Ford front axle and Model A rear axle directly to it. He committed the earlier car’s shape to metal and achieved a 132-mph run with a Chevy engine topped with a three-port Olds head before selling it to Stu. Only instead of giving Stu the car’s engine, Warth offered the following caution: A V8 wouldn’t fit in the narrow frame.

Stu wasn’t a name yet, but he was far from inexperienced. The father of his pal Eddie Miller Jr., was the senior Miller of Duesenberg fame. Guided by the senior Miller and helped by the junior, Stu wedged a V8 between those unforgiving rails and clicked off a 134-mph run before the government canceled all official race meets.

The war may have suspended Stu’s racing activities, but during his stint as a gunnery instructor he developed the ideas that Miller Sr. planted, among them: solutions to the fuel-distribution problems that plagued flatheads. His re-entry into racing after the war gave him more food for thought. Although Stu’s engine benefited from



the improved fuel distribution that Miller Sr.'s unique four-carburetor manifold provided, the zinc-bodied carburetors bolted to it tended to dissolve and plug up in the presence of methanol.

With the understanding that fuel injection would solve the problems in one swoop, Stu set to work. However, with few tools, much less the applied knowledge of how to make a fuel-injection system work, he admitted progress didn't come easily. Ironically, some of the greatest resistance he faced was from the people who stood to benefit most from his labor: the hot rodders of the day.

But the ultimate resistance Stu met was the hard-packed El Mirage lakebed at the August 10, 1947 SCTA meet. The wire wheel at the left-rear corner of the car collapsed at speed and sent the car into a tumble. The car's lack of rollcage—one of the shortcomings that killed early streamliners—meant Stu's head and shoulders bore the brunt of the car's hurtling weight.

According to Stu, Miller Jr. repaired the car without telling him or taking a cent of compensation. Then, the following year on an unpublicized run, Stu proved, at least to himself and a few friends, that his system worked by using it to urge the car to at least 120 mph. With Howie Wilson at the helm, a follow-up run at the SCTA meet

on July 18, 1948, officially vindicated Stu when the car claimed the title as the first to transcend the 150-mph milestone.

Stu's newfound fuel-injection device immediately made him the darling child of Lou Meyer and Dale Drake, then stewards for the Offenhauser dynasty. Their dynamometer tests removed what few doubts remained about Stu's system, and within a very short time, hardly a race car remained competitive without one of Stu's injectors.

After quitting his steady job to start his injection business, he sold the car to Gerry Grant, owner of Grant Piston Rings. According to photos, the car resurfaced as a would-be dragster at an NHRA meet in Edna, Kansas. Although the Miller manifold still exists on Doc Parson's T-roadster, many believe that a subsequent owner dismantled, if not scrapped, Stu's car.

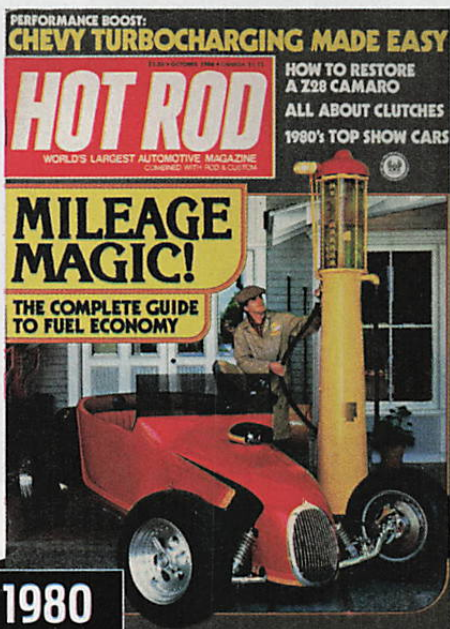
Not all was lost. Under the guidance of hot rod pioneer Stu Hilborn and Miller Jr.'s son, Lattin built a faithful recreation of the famed streamliner. We say Lattin built it, but just as it takes a village to raise a child, it took a team to build the car. Tom Drissi created full-scale posters of the car from photographs then Rick Peterson, Bill Lattin, Richard Lux, and Santos Garcia merged the once anonymous parts into an animated version of hot rod history.

The HOT ROD Archives

20 Years Ago

October 2000: 148 pages, \$3.99

Though it's not even mentioned on the cover, coverage of the 2000 Power Tour dominated this issue, with Feature Editor Jeff Koch compiling the travel notes of six different Long Haulers in an article that spanned 14 pages of this issue. The Tour started in San Bernardino, California, and ended at Panama Beach, Florida, 10 days later. The cover car, a 1957 Ford Ranch Wagon, was built by Troy Trepanier for customer George Poteet. Gray Baskerville nabbed the image, which was shot on the Tour somewhere outside of Phoenix. It's 500 hp came courtesy of a centrifugally supercharged 351 Windsor, and it survived the Tour in style with a "Borg Warner six speed" (now known as a Tremec T56), and a massive radiator that shed the 100-plus degree temperatures the Long Haulers endured through the desert southwest.



40 Years Ago

October 1980: 108 pages, \$1.50

Imagine being the poor slob working at a performance car magazine in 1980. You can feel the pathos in this issue's main cover line—Mileage?? Fuel Economy? My heart goes out to those guys. The depression continues inside where the majority of the ads are touting miserly fuel consumption of the widget or vehicle being marketed: gasoline saving motor oil, single-cylinder Suzuki motorcycles, and V6 powered fullsize pickup trucks that generate 19 mpg in the city. The cover car was built by Lil' John Buttera from the front half of a 1923 Ford and the back half of a '27. It was powered by a V6 that thankfully had a Magnuson supercharger stuck on top of it. Also featured was a 1974 Pinto powered by a flathead four-cylinder engine from a '32 Ford—seriously. Tech guru Jim McFarland wrote the piece on fuel economy, and it's actually really good. If you think about it, when you maximize an engine's performance by maximizing its efficiency, both mechanically and chemically, improved fuel economy is often an unintended, but beneficial, side effect. It's just hard to say all that on the cover!

60 Years Ago

October 1960: 124 pages, 35¢

George Hurst, co-founder of Hurst Performance appeared on the cover in 1960. At the time, his outfit was known as the Hurst-Campbell Company, and he was just branching out into the automotive aftermarket with a variety of engine-swap parts aimed at dropping V8 engines into the current crop of compact cars. To publicize this endeavor, he and business partner Bill Campbell dropped a 283 Chevy into the 1960 Plymouth Valiant owned by Art Conte, who is standing to George's left on our cover. Tech Editor Ray Brock covered the build, which required surprisingly little surgery to the Valiant's chassis. The conversion only added 70 pounds to the lightweight A-body, and owner Conte piloted it to an impressive (for the time) 14.83 second e.t. at 93 mph in the quarter mile, rowing a floor-shifted GM three-speed through the Valiant's open-differential rear axle and tiny bias-ply tires.



PROVEN TO MAXIMIZE ENGINE LIFE.



NEW FORMULA

**40% BETTER
WEAR PROTECTION
THAN INDUSTRY
STANDARDS.***

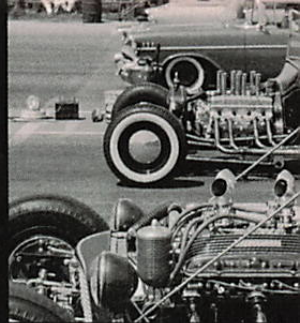
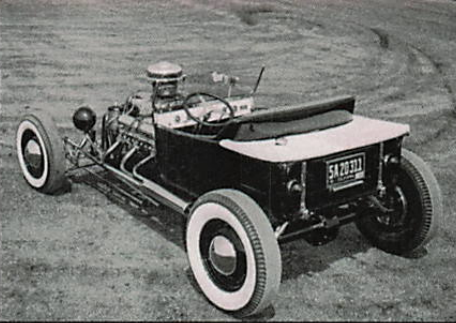
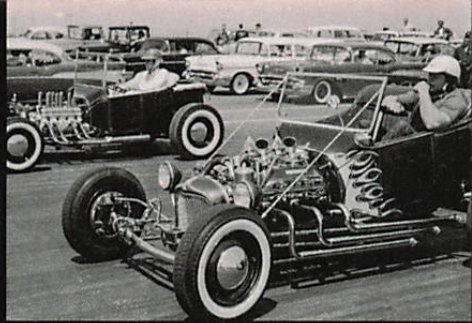
*AS TESTED IN THE INDUSTRY SEQUENCE X CHAIN WEAR TEST

The original motor oil. Better than ever.
Learn more at valvoline.com/original.



AMERICAN OWNED
& OPERATED

AMERICA'S FIRST
MOTOR OIL BRAND



The Kookie T Is Back!

The Restoration of Norm Grabowski's 1922 Ford, The World's First and Favorite T-Bucket

There are few hot rods or individuals that have garnered as much attention or generated as much excitement as this 1922 Ford Model T and the guy who originally built it. If you are a fan of all things cool, and know a little about rodding history, then the name Norm Grabowski will be familiar to you. The 1959 hit song inspired by the car, "Kookie, Kookie, Lend Me Your Comb," might be forgotten by everyone except oldies fans, but the car is still wildly popular and is still inspiring everybody who sees it—pretty amazing considering that the car was virtually nonexistent for almost 60 years.

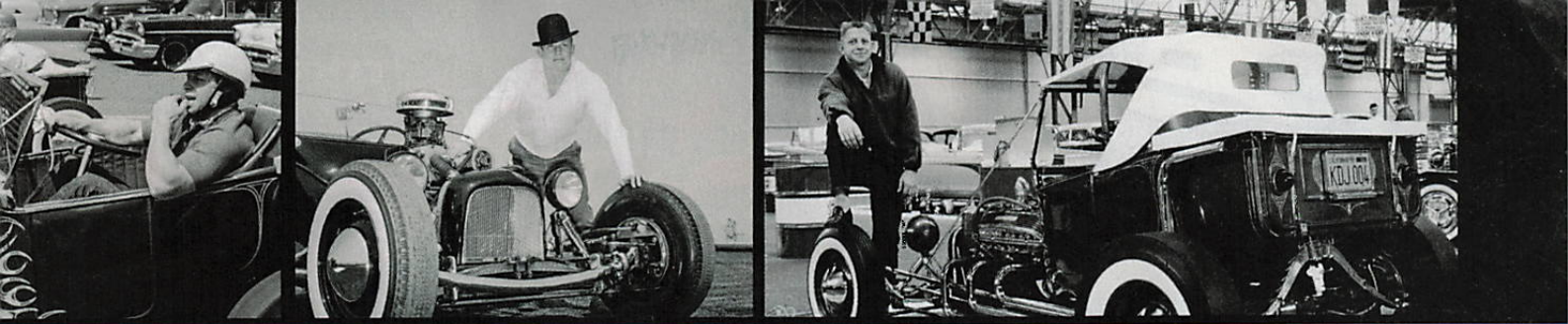
In its day, the flamed roadster pickup that would become famous as the Kookie T was one of the most groundbreaking hot rods around, and since then has become one of the most famous and influential hot rods ever. Practically every T-bucket built since then can trace its roots to Norm Grabowski's original T—from spitting-image replicas; to similar, but not identical tribute cars; to countless other roadsters built by people who might not even realize that their hot rods reflect design ideas that Grabowski thought of first.

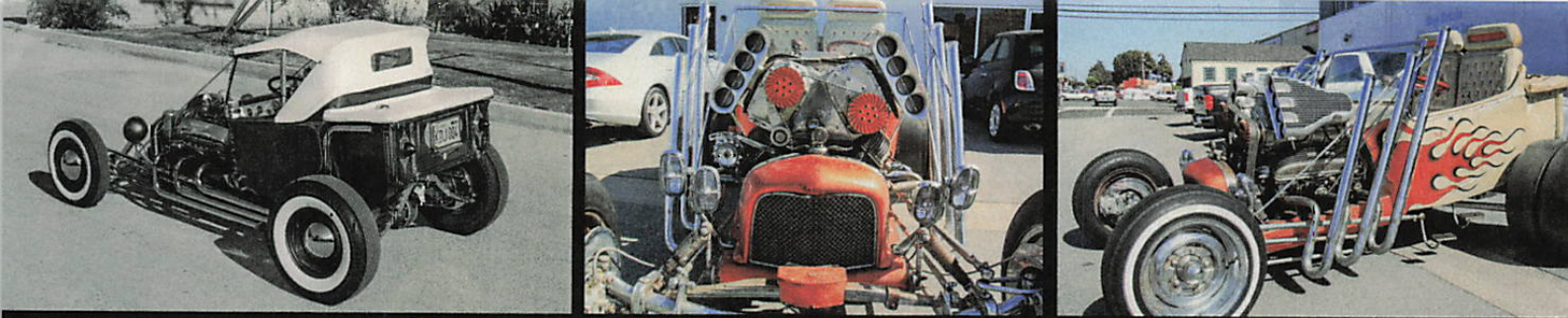
Kookie T Roots

Nineteen-year-old Norm Grabowski had just been released from the service when he started building what would become one of the most famous hot rods in history. This three-year project became what's now commonly called a T-bucket. Norm rustled up a forsaken 1922 Ford Model T Touring for a mere \$5. The body was cut down and the front half backed up to an extremely shortened Model A roadster pickup bed then mounted on the completely reworked frame of his Model A. The sheetmetal combo from a \$100 Model A A/V8 fenderless roadster was placed on the framersails. What's an A/V8? A Model A roadster with a Ford flathead V8 nestled between the framersails; that's the short version. The framersails were Z'ed in the rear, resulting in a plunging rake. Twenty inches were removed from the rear of the frame, and five inches were added to extend the frontend. The unique front suspension—Norm's variation of a suicide frontend—has been copied often, but in the mid '50s it was groundbreaking. Hot rodder, drag racer, and childhood star Tommy Ivo adapted the design on his own famous Grabowski-inspired T.



✍ Brian Brennan and Tim Bernsau
📷 Jorge Nunez, the Petersen Archives, and Roy Brizio Street Rods



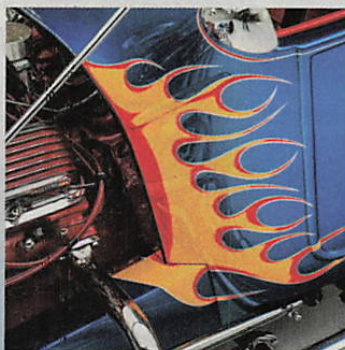
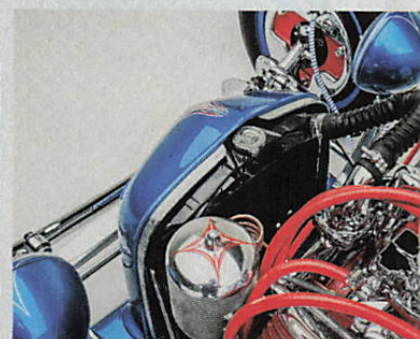
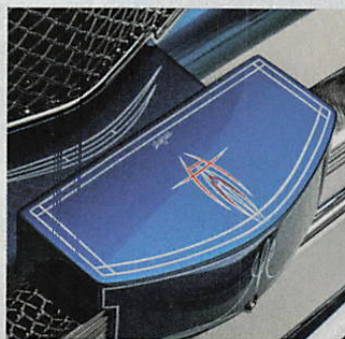


THE KOOKIET

"What Norm had was sort of a reverse suicide frontend," Ivo said in an interview with *Street Rodder* magazine. "He had taken the radius rods [1940 Ford wishbones], and instead of running them from the axle back, he reversed them, cutting them off short right next to the axle, so that the axle was further forward than directly under the spring. That gave the car a 25-percent setback from the front spark plug to the front axle. In drag racing in the Street Rod class, you were only allowed a 10-percent setback. But the way he stuffed the motor up against the radiator—and with the suicide frontend and reversed radius rods—nobody realized what it was." Ivo built the frontend of his car the same way.

Norm was a frequent visitor at Valley Custom in Burbank, where, under the watchful eyes and hands of Neil Emory and Clayton Jensen, the car was mechanically sorted out. One episode involved an incorrectly installed steering box, causing the car to steer opposite of how it should. Norm carefully drove the car to Burbank, where Neil and Clayton corrected the problem. Gary Emory, Neil's son and Clayton's nephew, was a kid at the time, but remembers Norm's frequent visits. "Norm would build the car and put things together, and bring it down to the shop where my dad and uncle would do finish work on the car, making it fit right and cleaning it up."

The T was powered by a 1952 Cadillac engine (pulled out of his parents' new Cadillac) and topped with a 3-71 GMC blower sandwiched between a Bandimere intake and a stock Cadillac Rochester four-barrel carb. In its first iteration, the groundbreaking Model T featured a mono-black paint job with red Tony Nancy stitched pleats. Its iconic flames, distinctive exhaust system (with the pipes running alongside and below the cab and sweeping up alongside the bed),

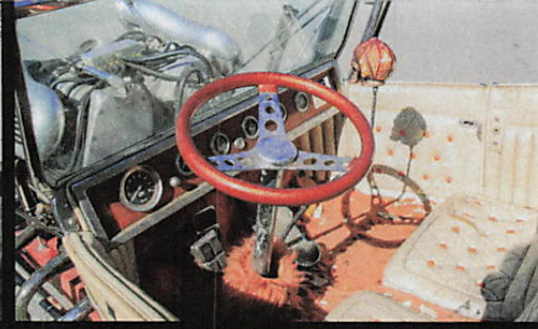
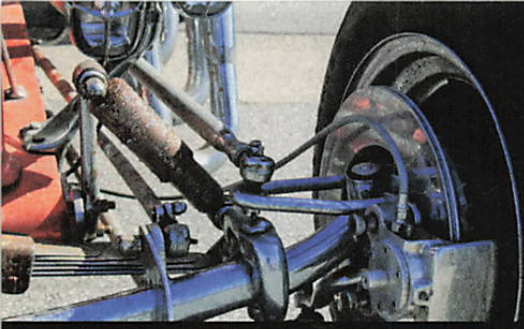




A PINCH BETTER
TOGETHER.



**WARNING: This product can
cause mouth cancer.**



THE KOOKIE T

and its most famous nickname, were all still a ways away.

Norm entered the T in dozens of hot rod shows and won trophies at all of them. In October 1955 (after appearing at the National Roadster Show in Oakland), the car showed up on the cover of *HOT ROD*'s October 1955 issue. Norm once told us that his name for the car was the Bad T, but the *HOT ROD* writer nicknamed it Lightnin' Bug. By this time, there couldn't have been a hot rodder in L.A. who wasn't familiar with Norm's T. It was a regular at Bob's Drive-In in Toluca Lake and on the streets of Hollywood. The car was drawing crowds wherever it went, with the wild-acting hot rodder attracting as much attention as his wild-looking hot rod.

Hot rods were catching the attention of Hollywood, and studios were busy producing youth-oriented B-movies featuring young stars, beaches, rock 'n' roll music, and hot rods. The Lightnin' Bug was soon on the big screen whenever a hot rod could be worked into a plot line.

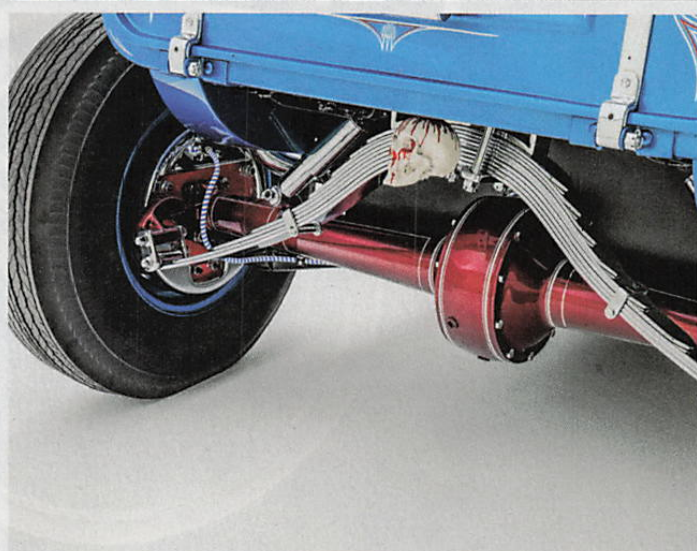
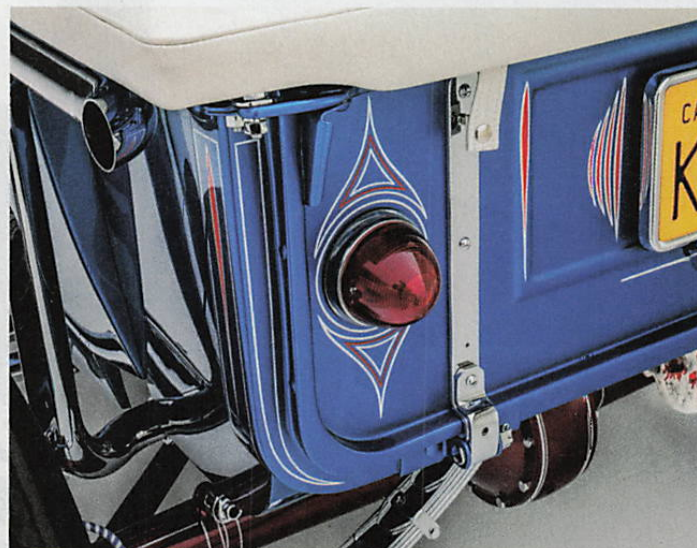
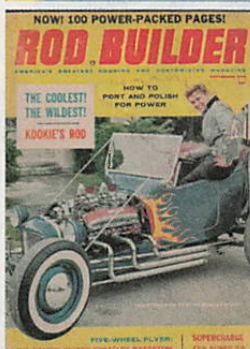
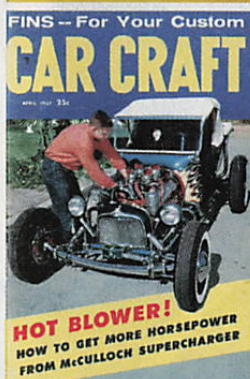
After a careless actor drove Grabowski's car into a post, the car went back to Valley Custom for repairs. Had that accident never happened, the Lightnin' Bug might never have become the most famous Model T in the world.

Birth of the Kookie Car

While being repaired at Valley Custom, the Lightnin' Bug began its transformation into the car we all know. Bright 1956 Dodge Royal Blue paint (set off with Dean Jeffries' flames) replaced the black finish. The Cad engine now sported four Strombergs atop a rare Horne manifold. The car's rake became more pronounced, the windshield grew in height, and the (now famous) bleeding-skull shifter knob took its rightful position, replacing the oversized dice. By now it also had the distinctive exhaust that swept up behind the cab and alongside the Model A pickup bed. The new cloth top was a functional addition—it hid Norm, who now insisted on driving his car whenever it appeared in a movie. Those famous flames may have served a function, too. There's a story, possibly true, that the reason Norm added the flames to the roadster was to cover up the paint chips it got when actors would let the passenger door fling open, nicking the cowl.

The newly-restyled T was getting a ton of attention on the street. "I was blowing minds," Norm told *Street Rodder* in 2010. "People with their mouths open, running through red lights. Cruising Hollywood Boulevard at night, I would stop somewhere and the car would be surrounded with people 10 deep, all over it, looking under it, looking all around it. The reaction was just unbelievable."

The car was revealed to the rest of the world with a cover story in the April 1957 issue of *Car Craft*. The same month, *Life Magazine*, investigating Southern California's hot rod culture, published photos



GRAB HOLD OF THE UNTAMED AMERICAN SPIRIT FOR OVER 50 YEARS

Piston-tough,
Premium Grade
Stainless Steel

Original Mustang Horse
with Red, White and
Blue Stripes Logo

Custom Real
Wood Inlay

Unique "Grommet"
Details



MUSTANG 
AN AMERICAN CLASSIC
COMMEMORATIVE RING

A CUSTOM-CRAFTED JEWELRY EXCLUSIVE

For over half a century, the Ford Mustang has been turning the heads of car enthusiasts across the country. You only need to say the name to conjure up an image of sporty styling and performance. Now you can grab hold of that wild Ford Mustang spirit and show your passion for a true American original with a new jewelry creation fully authorized by Ford Motor Company—the "Mustang: An American Classic" Commemorative Ring. Our designers have gone to great lengths to capture some of the Mustang's distinctive features in a retro-look and, then, matched it with the superb craftsmanship. With this exclusive ring, you'll enjoy a whole stat sheet of features, including hand-crafting in premium grade solid stainless steel, a custom real wood inlay at the very center with a raised-relief original Mustang Horse and stripes logo, surrounded by a brushed metal frame with unique "grommet" details. Adding to the value, the sleek band on each side shows off the famous Mustang name in script along with a representation of the logo stripes in black.

A LIMITED-TIME OFFER FOR PREFERRED CLIENTS

This distinctive jewelry design is individually made to order in men's whole and half sizes from 8 to 15, and it comes complete with a Certificate of Authenticity in custom presentation case. This bold ring is a remarkable value as well at just \$99.99*, payable in 3 installments of \$33.33. To reserve a ring in your name, backed by our unconditional 120-day money-back guarantee, send no money now; simply mail in your Priority Reservation. But don't delay... this is a limited-time offer!

Manufactured by The Bradford Group.
©2020 The Bradford Exchange
All Rights Reserved 01-29020-001-BI

Order online now at
bradfordexchange.com/29020

Ford Oval and nameplates and vehicle
trade dress are trademarks owned and
registered by Ford Motor Company.



LIMITED TIME OFFER

Reservations will be accepted on a
first-come, first-served basis.
So please respond as soon as possible
to reserve your ring.



Actual Size

B The
Bradford Exchange
• Since 1973 •

P.O. Box 806, Morton Grove, IL 60053-0806

SEND NO
MONEY NOW

PRIORITY
RESERVATION

YES. Please reserve the Please reserve the "Mustang:
An American Classic" Commemorative Ring for me as
described in this announcement. **Please Respond Promptly**
Ring size _____ (If known)

SATISFACTION GUARANTEED
To assure a proper fit, a ring sizer will be sent to you
after your reservation has been accepted.

Signature _____

Mrs. Mr. Ms. _____

Name (Please Print Clearly)

Address _____

City _____

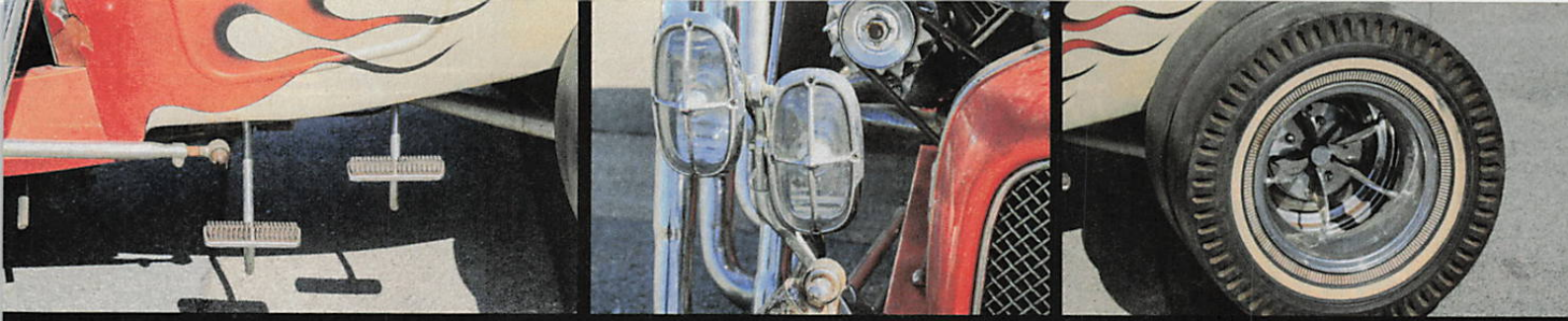
State _____

Zip _____

E-Mail (Optional) _____

*Plus a total of \$9.98 shipping and service
(see bradfordexchange.com). Allow 4-6 weeks after initial payment for delivery. Sales subject to
product availability and order acceptance.

01-29020-001-E94711



THE KOOKIE T

of Norm and his transformed T-bucket, including the now famous shot of Norm and the T parked at Bob's. "It was photographed so much, and it hasn't ever gone to my head. I'm still a great guy," Norm assured us several years ago. Suddenly the whole country, not just enthusiasts, was familiar with the wild, flamed T-bucket. But the greatest publicity was yet to come.

In 1958, ABC launched the TV series, *77 Sunset Strip*, a detective series featuring Edd Byrnes as Kookie, a hipster, slang-talking young parking lot attendant. Kookie's car had to be as cool as he was, and that role went to Norm's already well-known flamed Model T. Fans watched intently every week just to see the hot rod and its fictional beatnik driver. Kookie was so popular, the character inspired the previously-mentioned song, "Kookie, Kookie, Lend Me Your Comb," recorded by Byrnes and Connie Stevens. The series ran six seasons and gave Norm's Model T its third, and permanent, nickname. Kookie was a Hollywood idol, but for hot rodders, the Kookie T was the real star from *77 Sunset Strip*.

There would be one more magazine cover. Norm's hot rod appeared along with Edd "Kookie" Byrnes on the September 1959 cover of *Rod Builder*. While the T-bucket was famous and familiar by that time, there was one new difference. The exhaust pipes now shot up and exited directly behind the driver instead of running along the pickup bed top rail as they had done for the past several years. That must have made for some deafening sounds and tired eardrums once Norm, or Byrnes, was done running around the streets of Hollywood and Burbank.

New Identity

Norm's Model T, now a national celebrity, continued to appear in movies, but Norm only owned it until 1959. He then sold the Kookie T to Jim Skonzakes (aka Jim Street). The blue paint and yellow flames were soon repainted pearl white (by Larry Watson) with candy red flames. In its final public incarnation it was unrecognizable as the Kookie T, wearing dual slicks, quad headlights, twin blowers, and white high-back diamond tuft seats, among other changes.

As so many famous cars have a way of doing, this car faded from the public. After exhibiting the transformed Model T on the show circuit for a while, Street put the car away in his garage and closed the door. Norm moved on to other rod and bike projects, acting roles, and a successful music career in Branson, Missouri. He later became well-known for elaborate wooden skull sculptures.

During the decades that followed, there were many T-buckets built with the influence of the Kookie T, as well as some extraordinarily faithful replicas of Norm's original. The two best known clones were built by Johnnie Overbay at Reno Rod & Custom Supply and another built by Von Franco (who also replicated the Lightning Bug version of the car). These meticulously recreated versions of the Kookie T were appreciated by all of us who loved the car and assumed that it would remain a memory.

The Kookie T Comes Back

Norm passed away on October 12, 2012, but hot rod history decided there was at least one more chapter to be written about his most

During the decades that followed, there were many T-buckets built with the influence of the Kookie T, as well as some extraordinarily faithful replicas of Norm's original.

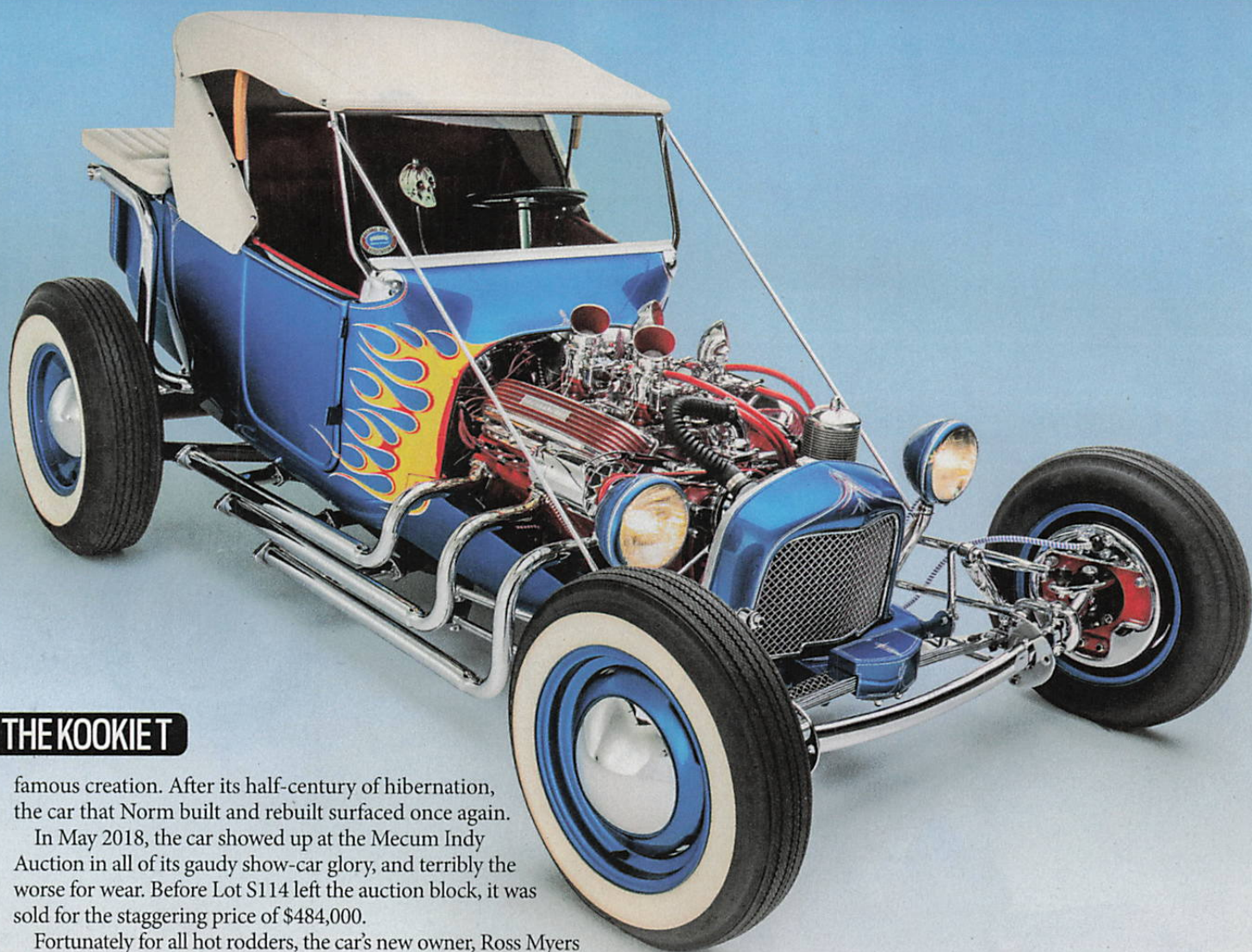




Go wherever the road takes you.

Whether you were born half-man, half-motorcycle
or just born to ride, there's America's #1 motorcycle insurer.

PROGRESSIVE
1.800.PROGRESSIVE | PROGRESSIVE.COM



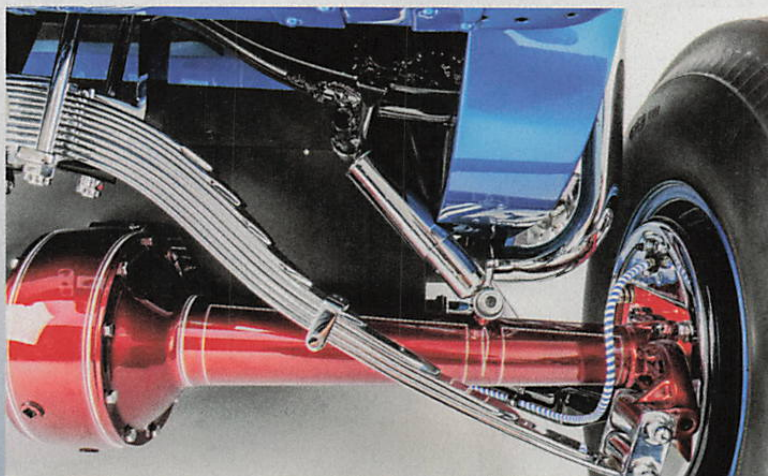
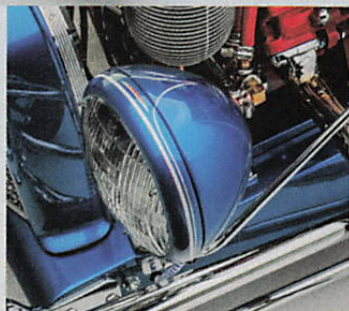
THE KOOKIET

famous creation. After its half-century of hibernation, the car that Norm built and rebuilt surfaced once again.

In May 2018, the car showed up at the Mecum Indy Auction in all of its gaudy show-car glory, and terribly the worse for wear. Before Lot S114 left the auction block, it was sold for the staggering price of \$484,000.

Fortunately for all hot rodders, the car's new owner, Ross Myers of Boyertown, Pennsylvania, is an avid hot rodder who recognized the true value and historical significance of this car. His intention in spending almost half a million dollars for the car was to restore it to the way it appeared on the cover of *Car Craft* in 1957.

Myers knew that to achieve his goal he would rely on the talents of his longtime friend Roy Brizio and the team at Roy Brizio Street Rods (RBSR) in South San Francisco. Brizio has built several incredible street rods for Myers in the past. It took RBSR a year to complete this one. The project involved restoration, not modification, and Brizio invested a great deal of time researching the many different iterations of the Kookie T. In the '50s, the car was a constant work in progress, with Norm making changes week to week. The most noticeable difference was the tailpipe treatment. When the car appeared in *Rod Builder* and on *77 Sunset Strip*, the tailpipes rose straight up above the side of the body between the cockpit and the bed. In the *Car Craft* feature, as here, they turn rearward along the upper edge of the bed.



CONSIDER THE SOURCE

From The Very Beginning:



To The Current Day:



American Made - American Proud
American Strong

Since 1990, Painless has been manufacturing the highest quality electrical components right here in the U.S.A.

For enthusiasts, by enthusiasts, Painless is led by a passion-driven team with one goal in mind - to make wiring your ride a Painless experience.

The next time you spend your hard earned money on parts for your project, we ask that you please....

CONSIDER THE SOURCE

PAINLESS

PERFORMANCE PRODUCTS

TECH LINE: 800.423.9696



303automotive.com

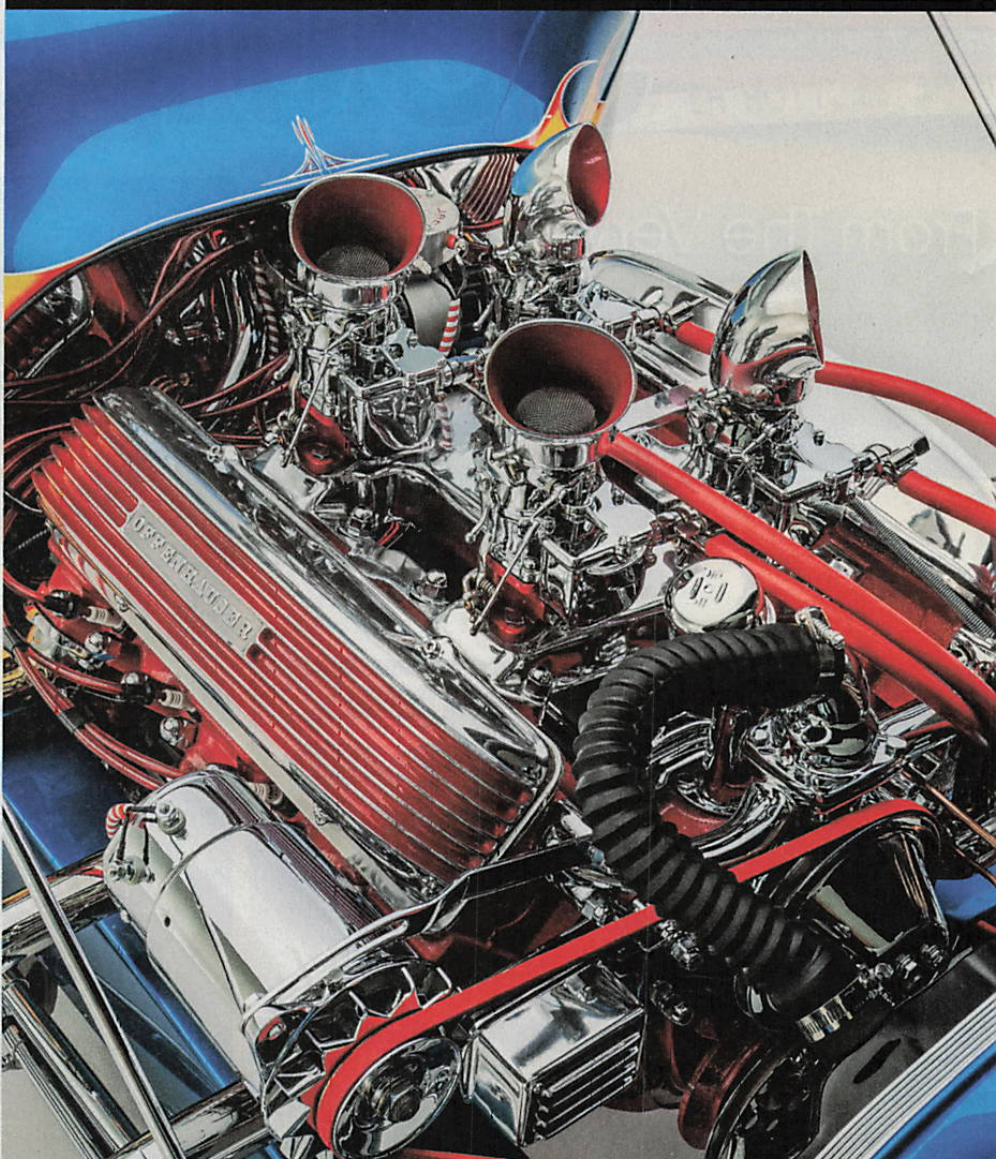
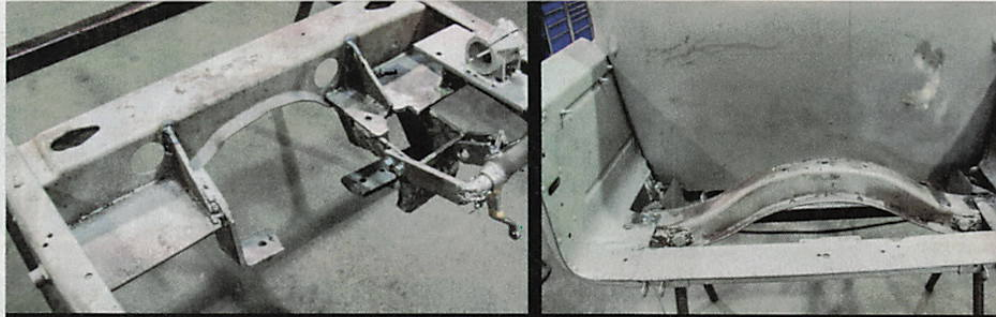
WHEN YOU DON'T HAVE THE TIME



WE'VE GOT YOUR NUMBER®

You want to bring out the depth and gloss in your ride's paint, but don't have the time for a full wax? 303® Touchless Sealant is your answer! Simply spray on, rinse off, and dry. It's that easy!

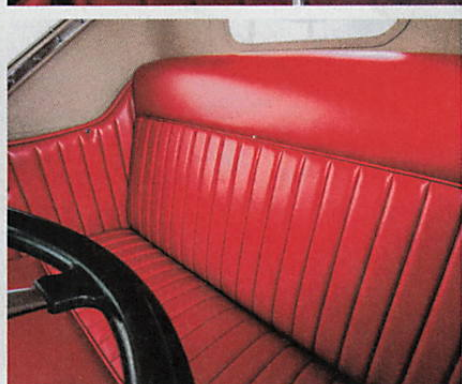
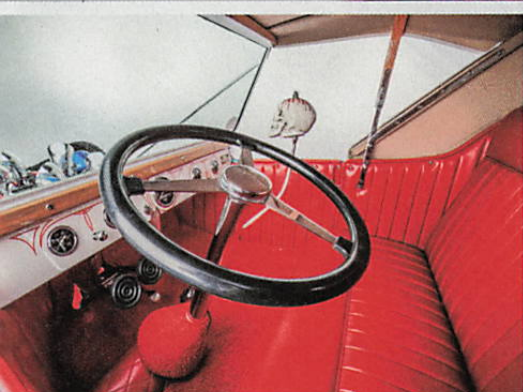
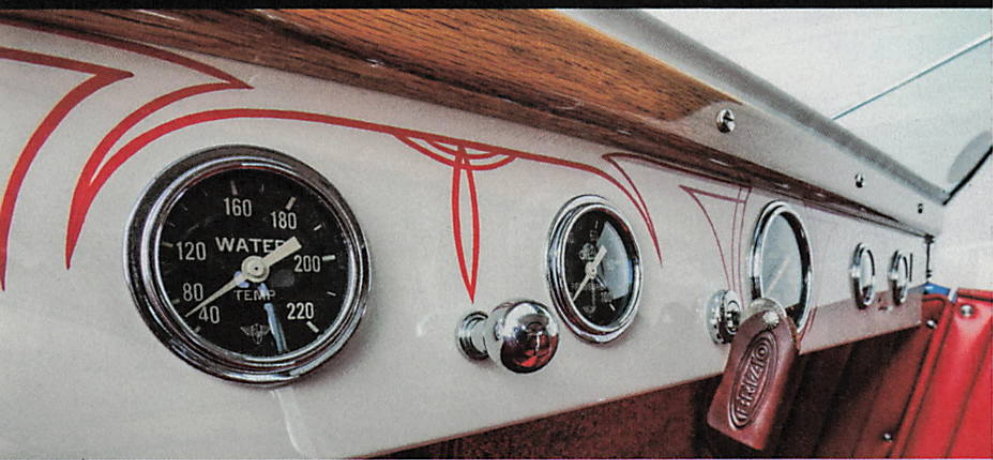
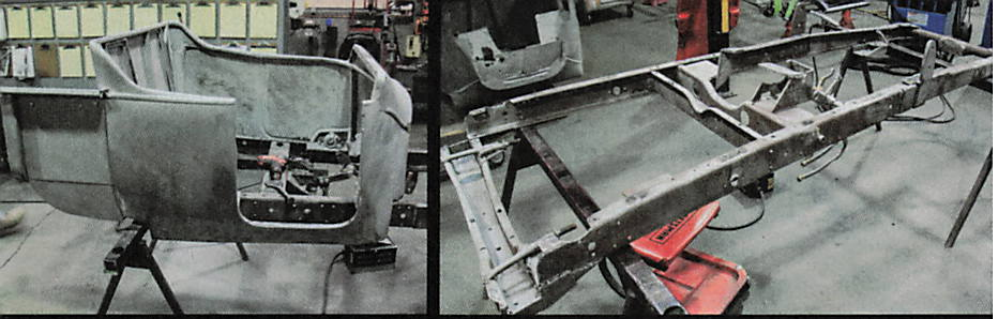
AVAILABLE AT:



THE KOOKIET

The full restoration included dismantling, documenting, fabrication, assembly, and detailing. John Gianoli built the famous 1952 Caddy 354ci powerplant, loaded with a Winfield solid camshaft and Studebaker rocker arms. The rare Horne side-by-side intake is topped with four Stromberg 97 two-barrel carbs, between a pair of Offenhauser valve covers. A Jackson Roto-Faze ignition sprouts Speedway Motors primary wires. The Cadillac is finished off with Brizio headers and a Jack Stratton custom exhaust, utilizing Smithy's glasspack mufflers. Backing up the Cad V8 is a 1939 Ford transmission with Zephyr gears, shifted by the era-correct S-curve lever with one of Norm's unique bleeding-skull shifter knobs.

The tires and wheels are a combination of U.S. Royal Laredo whitewall rubber (5.60x15 and 8.20x15) wrapped around original 14x4½ and 15x6 Ford steelies with smoothie caps. This collection of rubber and steel holds up the 1931 Ford Model A frame, shortened to a 96-inch wheelbase. The suspension includes modified 1941 Ford rear torque tubes with Ford axles, 1940 Ford drum brakes, and a Model A rear spring. The frame was lengthened 5 inches in front, to accommodate the engine position. The suicide frontend configuration runs a 1937 Ford tube axle and spindles. Braking is accomplished via a 1939 Ford pedal assembly actuating a 1940 Ford master cylinder. Steering is handled by a 1938 Chevy box with a chromed 1½-inch tube steering column, topped with a Bell three-spoke wheel in the cockpit.



Sid Chavers Upholstery rejuvenated the interior, covering the bench seat with traditional pleats artfully stitched in lipstick red Naugahyde. The matching red carpeting is another touch from the Chavers sewing machine, as is the beautiful top. Other interior appointments include the Stewart-Warner gauges, and a dash plaque reminding us of the car's visit to the 1955 National Roadster Show.

The body and paint details were turned over to Darryl Hollenbeck of Vintage Color Studio. He used PPG paint to accurately re-create the Dodge Royal Blue, wicked flames, and pinstriping originally applied at Valley Custom 60 years earlier.

Eric Reyes replicated the car's miles of highly-recognizable pinstriping. Sherm's Custom Plating provided the massive amounts of first-class brightwork. Other accompaniments to the body are the Toronado stands gripping the Arrow headlights and a pair of 1954 Buick taillights, mounted into the tailgate. Hiding within the custom bed is a 10-gallon gas tank.

Since its completion, the resurrected Kookie T has been making the rounds, just like it did in the '50s under Norm's ownership. It debuted at the 2019 Pebble Beach Concours d'Elegance, followed by appearances at the Grand National Roadster Show and the Detroit Autorama earlier this year. Our favorite appearance was in the HOT ROD photo studio. The Kookie T is an iconic hot rod that we'd never seen in person and assumed we never would. But this important piece of hot rod history has been brought back thanks to the hands of Roy Brizio, the heart of Ross Myers, and the spirit of Norm Grabowski. 

BETIM BERISHA OWNER, BBI AUTOSPORT



TO BE THE BEST + YOU HAVE TO RUN + THE BEST

Everything that goes in guarantees you can get the most out — 99.99% pure lead, direct flow cast-on straps.

*WE ENGINEERED THE
QUIT OUT OF IT.*

MORE THAN 15X
VIBRATION RESISTANCE

3X MORE LIFE

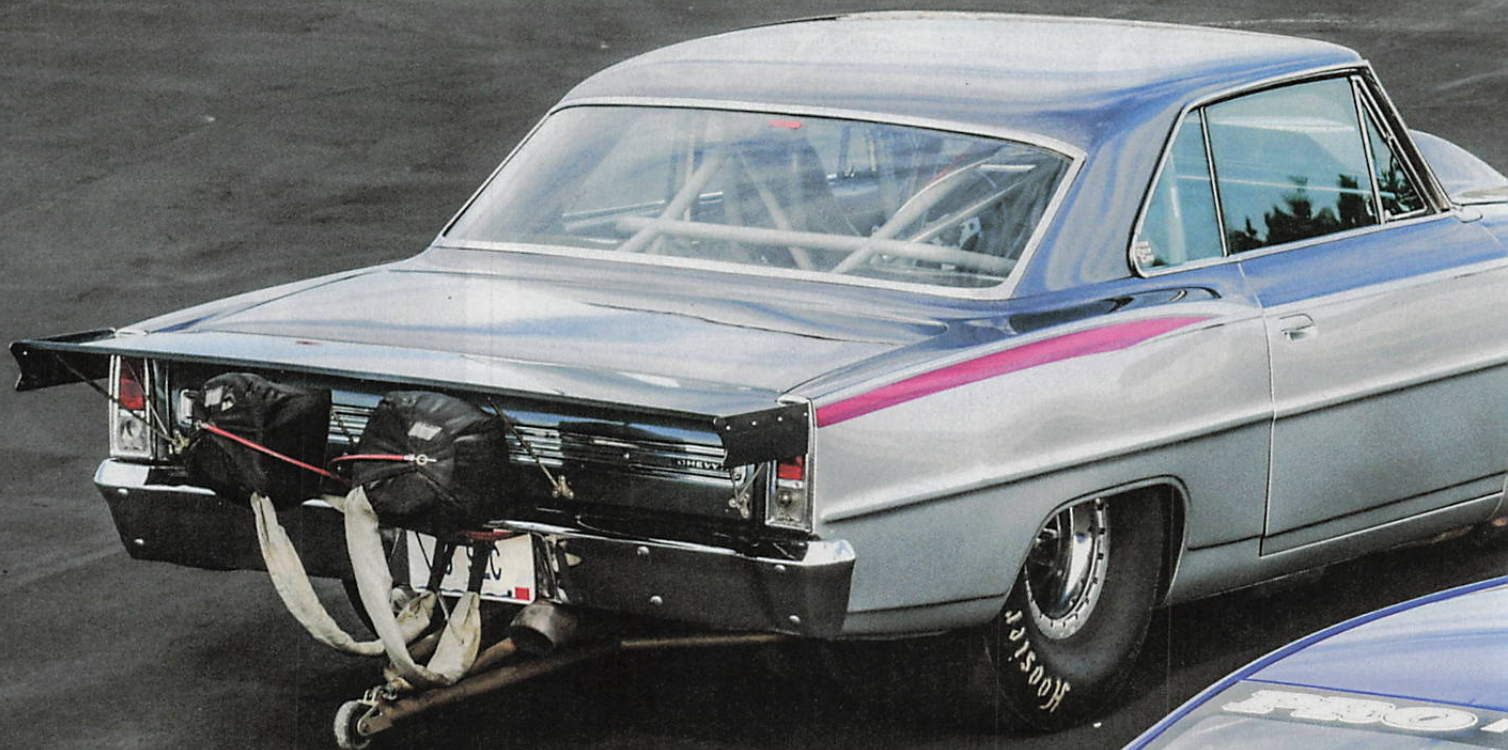
800 COLD CRANKING AMPS

STARTING AT
\$199.99*



CLARIOS
OPTIMABATTERIES.COM

*MSRP. EXcludes tax, title, license, and optional equipment. Price subject to change without notice.



CADDYFAST!

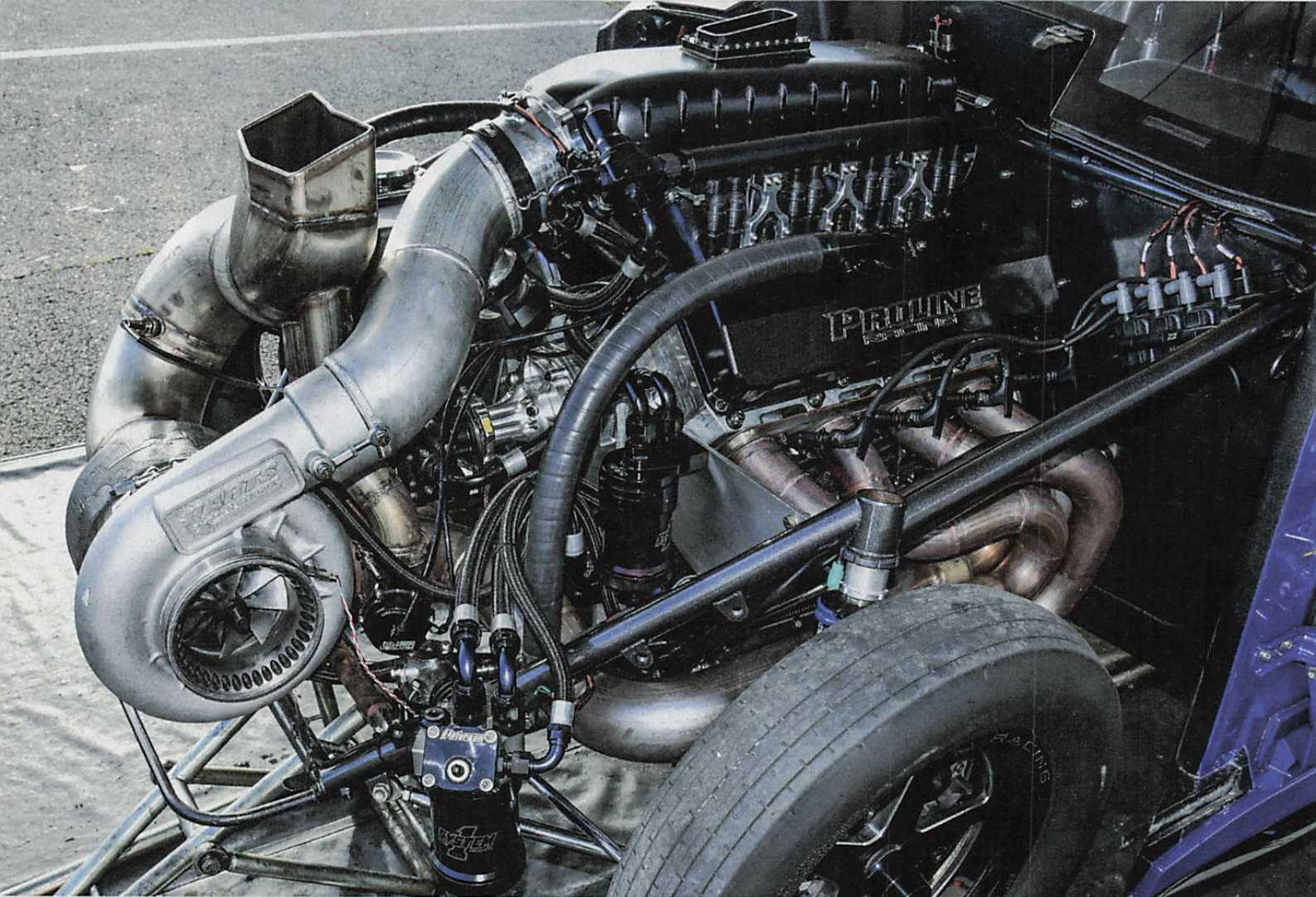
Five-Time Drag Week Winner Larry Larson
Built a Unique Race Car for *No Prep Kings*

📷 Arvid Svendsen



This stunning 2016 Cadillac built at Larson Race Cars in Oak Grove, Missouri, can be seen regularly on *Street Outlaws: No Prep Kings* (NPK) on Discovery. NPK is a spinoff of the original *Street Outlaws*, a show that began in 2013. No Prep racing quickly gained favor with fans and racers, and NPK is now in its fourth season.

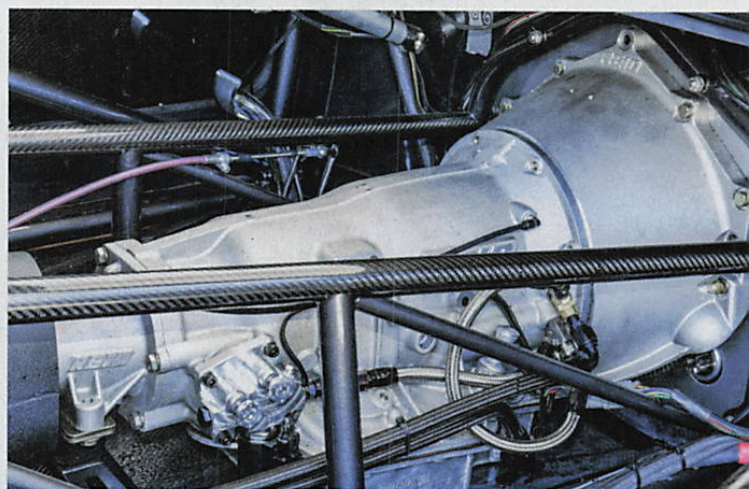
Larry Larson began competing on NPK during its inaugural year in 2016 behind the wheel of his big tire S10. Because the truck did not fit the rules of No Prep racing, Larry was told by the sanctioning body to make changes to the bed in order to comply. Larry famously spliced a bed section onto his truck and was permitted to compete in the latter part of the first season and the entire second season.



CADDYFAST

For the third season, NPK announced that it was going to insist that race cars be more “stock appearing.” Larry explains, “For Season 3 of *No Prep Kings*, I was told that I would have to change a few things on my S10 to make it legal. The truck had been built for Drag Week, so I figured it was time to build something new that would be purpose built for No Prep racing. A new car would allow me to incorporate new ideas and technology. I wanted to do something different, but it had to be a car that would fit a big tire and still be able to sit low. The late-model cars have better aerodynamics, so I started looking at the Cadillac ATS-V and decided it would be the right car to build for No Prep.”

The unconventional choice of a 2016 Cadillac ATS-V is not the only noteworthy feature of Larson's car. The crew at Larson Race Cars decided to build a car that would both comply, and go beyond,





NEVER SETTLE FOR LESS THAN THE ULTIMATE

Every OPTIMA® battery is built and tested in the world's most advanced battery facility — where precise automation is coupled with the highest quality components. 99.99% pure lead, advanced electrolytes, pure poly casing and direct flow cast-on straps to deliver power, performance and reliability unrivaled by any other battery on the market. OPTIMA, THE ULTIMATE POWER SOURCE® — *BECAUSE WE ENGINEERED THE QUIT OUT OF IT.*

STARTING AT
\$199.99*

MORE THAN 15X VIBRATION RESISTANCE / 3X MORE LIFE / 800 COLD CRANKING AMPS

WWW.OPTIMABATTERIES.COM

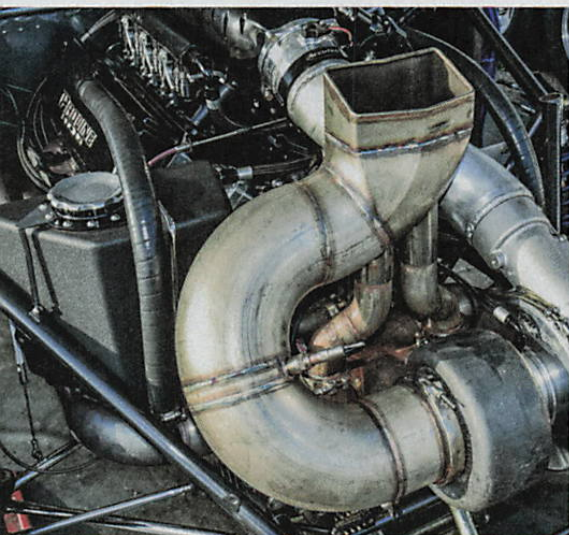
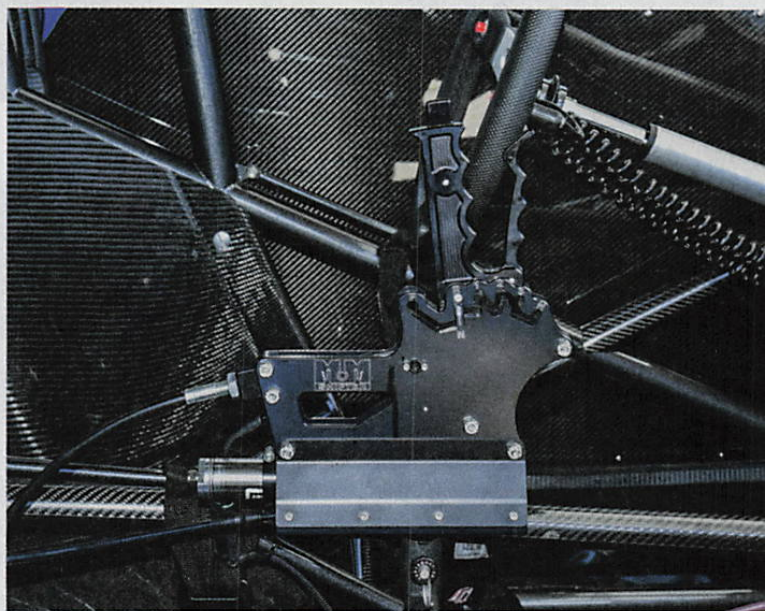




CADDYFAST

NPK's requirement for stock-appearing cars. The Cadillac takes "stock appearing" to a new level of innovation. Whereas many No Prep race cars lean heavily on lightweight aftermarket body parts, every panel on Larry's Cadillac is the stock steel body panel found on a 2016 ATS-V. The vented carbon-fiber hood is OEM, factory-installed on the '16 ATS-V. There are no visible Dzus fasteners or window screws on the Cadillac. Remove the wing and the fat tires, and the car gets close to looking like a stock ATS-V. Rejecting the No Prep chic of primed fenders, side-swiped doors, and vinyl wraps, the Caddy races with show-car quality paint and body work performed by Goachers Street Legends (GSL) in Wathena, Kansas.

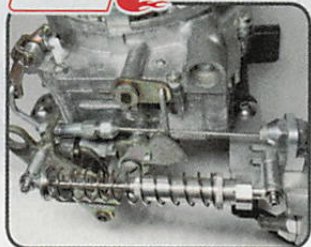
Conventional wisdom among No Prep racers relating to the production of big horsepower levels boils down to three options: a twin-turbo configuration, a single supercharger, or nitrous. Larson breaks rank with that thinking, however, opting instead for a gargantuan, single 140mm Hart's Diesel & Machine turbocharger. The fact that the single-turbo setup is still in place suggests that he is happy with the results.





Let's Build It Together

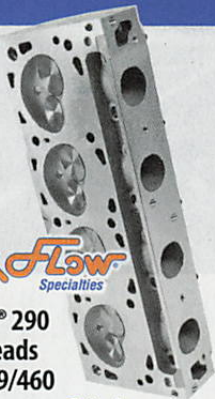
HPI



Throttle Return Spring Kits
Keep Loose Springs Contained!

Keyword: HOT Throttle Return Kick
as low as \$119.99 kit

Trick Flow
Specialties



PowerPort® 290
Cylinder Heads
for Ford 429/460

Bigger Horsepower Gains!

Keyword: TFS PowerPort 290
as low as \$1,235.99 assembled, each

BTR Brian Tooley Racing



Valve Spring Height Micrometer
Consistent Accuracy!

Keyword: BTC Micrometer
BTC-BTRHM \$59.00 each

Strange



Pro Race Custom Axle Packages
Ready for the Track!

Keyword: STR Hy-Tuf Pair
as low as \$432.99 pair



Sportsman S/R Tires
Great Traction!

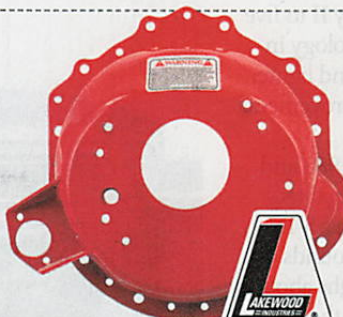
Keyword: MTT S/R
as low as \$188.99 each

FLAMING RIVER



Manual Rack and Pinion
Steering Systems
Compact and Lightweight!

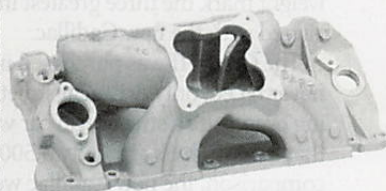
Keyword: FLA Manual Rack Cast
as low as \$244.99 each



Safety Bellhousings
SFI Approved!

Keyword: LAK Safety Bell
as low as \$535.95 each

DART



Single Plane Intake Manifolds
Delivers the Power You Need!

Keyword: DRT Single Plane
as low as \$458.43 each



Trailer Ramps

Each Ramp Supports 1,500 Lbs.!

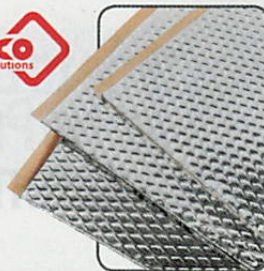
Keyword: BTI Trailer Ramps
as low as \$261.25 pair



Remote-Mount Single Turbo Kits
Mount Anywhere!

Keyword: SQT Remote Turbo
as low as \$2,049.95 kit

Noico
solutions



Heat Barrier and
Sound Deadening Mat Set
Keep Noise and Heat Out!

Keyword: NIO Heat
NIO-SMR24 \$47.99 set of 6

Summit
Gifts, Clothing & Memorabilia



Toolbox
Mini Fridge
with Bluetooth

Chilled Beverages and Cool Tunes!

Keyword: SUM Mini Bluetooth
SUM-P01058 \$329.99 each

SPECIAL HANDLING SURCHARGES APPLY

EBC
BRAKES

HOTCHKIS
SPORT SUSPENSION

POWERBOND
Harmonic Balancers

VALAIR
Performance Diesel Clutches

PIONEER Inc
Automotive Products

TCL
AUTOMOTIVE

POWERSTOP

UMI
Performance

UNBEATABLE SERVICE, TECH ADVICE, SATISFACTION, AND SELECTION.

FAST
FREE
SHIPPING
over \$99

Call by 10 pm EST: In-Stock Parts Shipped That Day!

1.800.230.3030 • Int'l: 1.330.630.0230

SCode: 2010HR • Prices subject to change without notice. Please check SummitRacing.com for current pricing. Typographical, description, or photography errors are subject to correction. Some parts are not legal for use in California or other states with similar laws/regulations. Please check your state and/or local laws/regulations. © 2020 AUTOSALES, INC.

Summit
RACING EQUIPMENT
SummitRacing.com

CADDYFAST

The engine is a Pro-Line Racing 481X Stage 4 572-cubic-inch unit that pumps out “a lot more than 3,000 horsepower.” The engine is based on an AJPE race-only billet aluminum block with no water jackets, hence the absence of a radiator. A Sonny Bryant crankshaft, Carrillo aluminum connecting rods, Bill Miller pistons, and AJPE billet aluminum heads provide reliability at mega-horsepower levels. The engine is fed by 16 Atomizer Racing Injectors, Accufab throttle body, and a Visner Engine Development billet intake manifold. Depending on the tune, the engine is capable of making close to 4,000 horsepower. A Rossler TH400 transmission with a ProTorque converter transfers power to a Strange Engineering rear with aluminum spool and 40-spline axles.

The addition of Larry Larson to the *No Prep Kings* show is a very good way to bring in thousands of fans who have followed his storied racing career. Larry drove his street-legal tube chassis 1966 Chevy II to five successive Drag Week wins. Technology in tuning, top-speed aerodynamics, and lighter weight mark the three greatest improvements gained with the new Cadillac.

The Chevy II was purchased in 1988 and never raced, only driven at street-legal racing events. It's a street-legal car with a VIN that runs high 6's at a hefty 3,500 pounds. In comparison, the new Cadillac weighs about 2,700 pounds. Larry's Cadillac sets the bar for race car construction that is much more than just “something different.” **MR**



“I figured it was time to build something new that would be purpose-built for No Prep racing. A new car would allow me to incorporate new ideas and technology.”

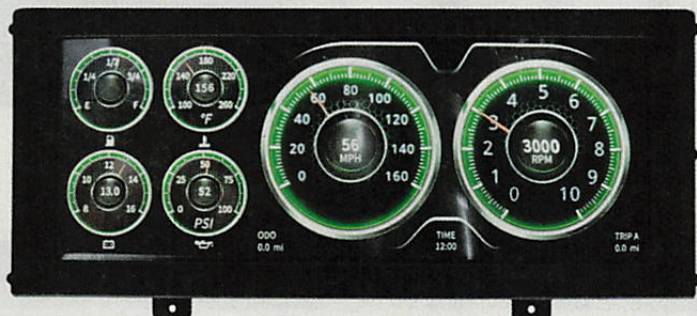


InVision Digital Dash

The new InVision Digital Dash is a six-gauge LCD system that allows you to monitor speedometer, tachometer, water temperature, oil pressure, fuel level, and volts all in one place on a bright 12.3" high-resolution display. Available in direct-fit solutions or as a standalone unit, you will be able to use this dash in a variety of applications. Featuring easy quick-glance readability along with the accuracy you have come to trust from AutoMeter, this system is the perfect solution for those looking to upgrade their worn, outdated, or inaccurate dashes with the latest offering from AutoMeter.

- 12.3" LCD display
- Three user selectable displays
- All kits include sending units for water temperature and oil pressure
- High beam and turn signal indicators as well as user selectable warning light
- Displays in imperial or metric measurements
- Speedometer calibrates to customer's vehicle with OEM, square wave, or sine wave signal input

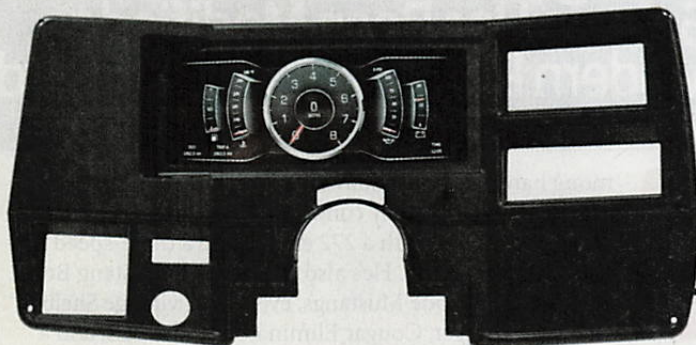
Universal LCD Dash



Model 7000

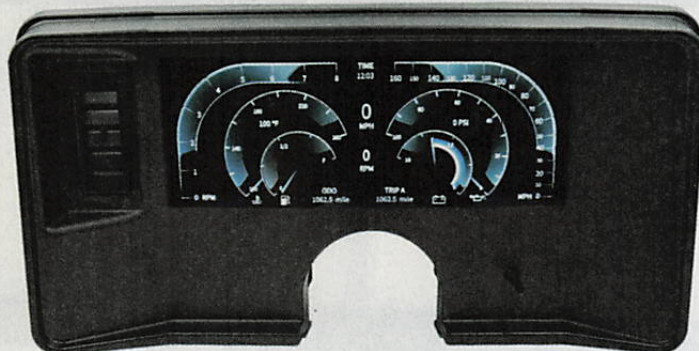
Chevy Full Size Trucks 73-87

Suburbans, Full Size Blazers and Crew Cab Trucks 73-91

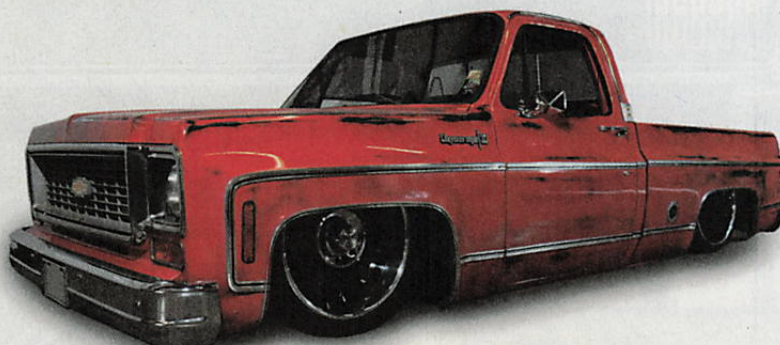


Model 7004

Monte Carlo, El Camino, Chevy Malibu, 82-87



Model 7005



AutoMeter.com

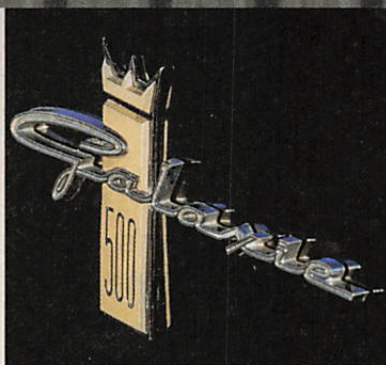


HR10 © AutoMeter Products 2020

TWO DECADE

Lovingly Restored, This R-Code Galaxie Has Been Modified to Modern Performance Standards

Among hardcore brand stalwarts, Stan Johnson is about as blue-blooded as they come. His first Ford was a 1957 Ford Custom 300 with a 272 engine and a three-speed he had when he was 16. He's also owned a '70 Mustang Boss 302, several K-code Mustangs, every year vintage Shelby, a Pantera, a Tiger, Cougar Eliminators and GTEs, and a few Starliners. Today, the tradition continues with this 1963½ Ford Galaxie 500. Keep in mind that Stan is a hard-working Regular Joe, and that most of these cars came and went at a time when muscle cars didn't cost a small fortune. Currently, his garage holds the Boss 302 he bought in '71 and this R-code Galaxie he acquired 20 years ago.



Eric English



E DEVOTION

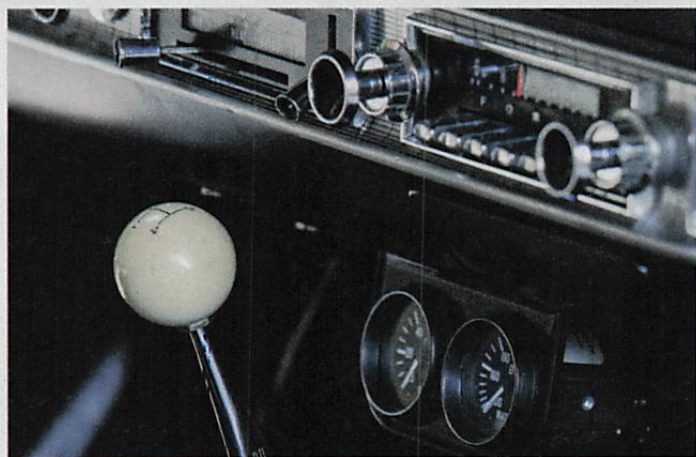


■ The rear backlight of 1963½ Galaxies isn't as steeply raked as later Mustangs, but it's still known as a fastback when compared to the stodgy "box-top" styling of its predecessor. Fast they were, with Galaxies doing well in both stock car and drag racing.



TWO DECADE DEVOTION

In 1984, Stan opened Ford Powertrain Applications (FPA) and became a wholesale distributor of Ford's high-performance parts program, then known as Ford Motorsport. Initially, he focused on engine building, but in 1989 Stan branched out into the world of building specialty headers, which is the bulk of FPA's business today. In fact, this Galaxie was owned by a customer in the '90s when it served as the platform Stan used to prototype FPA's 2-inch primary Tri-Y Galaxie headers. Soon after the header project, Stan was able to buy the car, which was mostly original and still wearing its original paint. About the only items that had been replaced were the transmission, the original T10 4-speed that had given way to a stronger Top Loader; and the differential had been upgraded to a Traction-Lok.



Classic Car Audio Solutions!



Licensed by GM & Ford



Audio systems from Custom Autosound

Custom Autosound replacement radios and speakers for Classics, Customs and Streetrods, Since 1977.

The latest audio technology including Bluetooth, USB and more with an OE fit and classic look

To find an authorized dealer near you, go to:
customautosoundmfg.com/store-locator

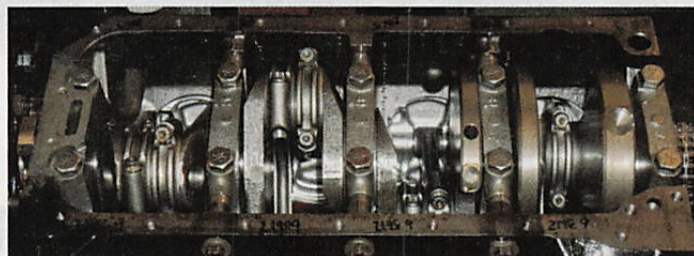
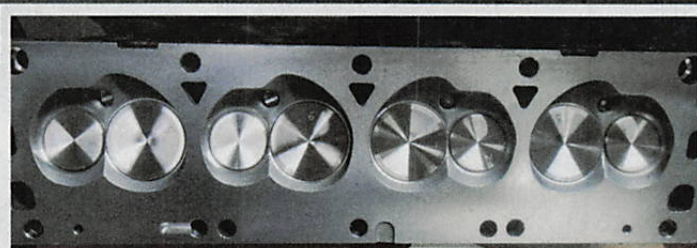


800-888-8637
customautosoundmfg.com

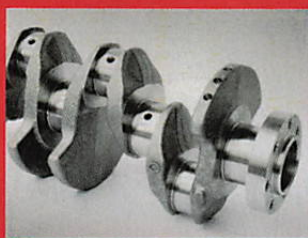


TWO DECADE DEVOTION

After several years, Stan began the process of restoring the big Ford with help and advice from Mark Shureman. The factory paint was resprayed after minimal bodywork, chrome and trim was redone and/or polished, and the suspension rebuilt with OE-grade components. Like any good hot rodder, Stan wasn't content to leave the dual-quad 427 alone. Rated at 425 hp in twin-Holley guise, Ford's 427 was a new addition to the option sheet in mid '63, and the baddest production FoMoCo powerplant to date. The critical dimensions were a 4.23-inch bore and 3.78-inch stroke, cross-bolted 4-bolt mains, "low riser" heads with 2.09/1.66-inch valves actuated by a solid lifter cam, and the whole affair was topped by an aluminum intake with either one or two Holley four-barrels.



Lubriplate®



PREMIUM QUALITY, HIGH PERFORMANCE SPECIALTY LUBRICANTS

**FROM A COMPANY DELIVERING QUALITY
AND PERFORMANCE FOR 150 YEARS**

150 years ago, our founders set out to make the highest quality, best performing lubricants available. In doing so, they helped pioneer the use of anti-wear additives that significantly increased lubricant performance through the years. Today, that tradition of quality and innovation continues with our line of high-quality, high performance specialty lubricants. Available products include...

No. 105 Motor Assembly Grease

- The "Original" Prelube for Installed Engine Parts.
- Prevents "Dry Start" During Initial Start Up.
- Trusted By Top Engine Builders For Decades.

Chain & Cable Fluid - Penetrating Oil

- A Superior, Non-Gumming Penetrating Oil.
- For Chains, Cables, Tools and General Lubrication.
- Loosens Rusty Nuts & Bolts. Also For Metalworking.

Spray Lube 'A' White Lithium Grease

- Sprays Like a Fluid, Congeals To A Grease.
- For Locks, Latches, Hinges, Battery Terminals and More.
- Creamy White Color - Correct For Classic Show Cars.

Gear Shield Extra Heavy

- Heavy-Duty, Extreme Pressure Spray Lubricant.
- For Gears, Pins, Bushings and Jack Screws.
- Excellent Fifth Wheel Lubricant for Trucks.

Biodegradable Penetrating Oil

- ECO-Friendly, Bio-Based, Multi-Purpose Lubricating Oil.
- For Tools, Locks, Latches and General Lubrication.
- Displaces Moisture and Will Deliver a "Wet Start."

SYNXTREME HD-2 Grease

- 100% Synthetic, Calcium Sulfonate Complex Formula.
- NLGI GC-LB Certified Wheel Bearing & Chassis Lube.

**QUALITY
INNOVATION
PERFORMANCE
FOR 150 YEARS**



Visit Our Online Webstore At: www.lubriplate.com



**CELEBRATING
150 YEARS
OF QUALITY, INNOVATION
AND PERFORMANCE**

LUBRIPLATE LUBRICANTS COMPANY
NEWARK, NJ 07105 / TOLEDO, OH 43605 / 800-733-4755
LubeXpert@lubriplate.com / www.lubriplate.com



Also Available At:

for store
locations
CARQUEST.com

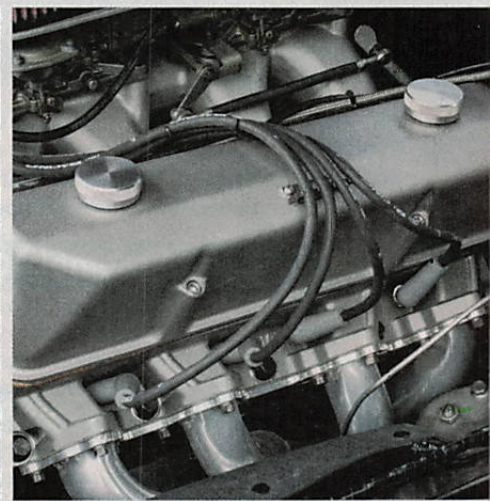
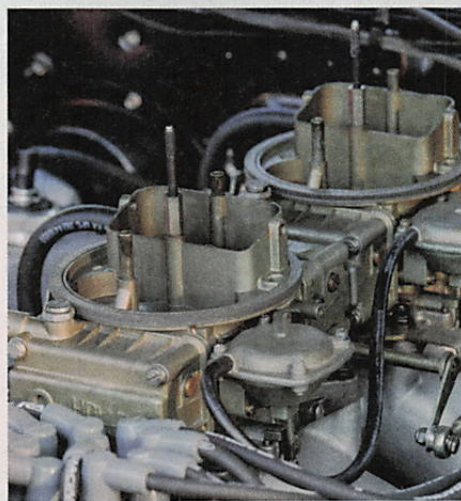
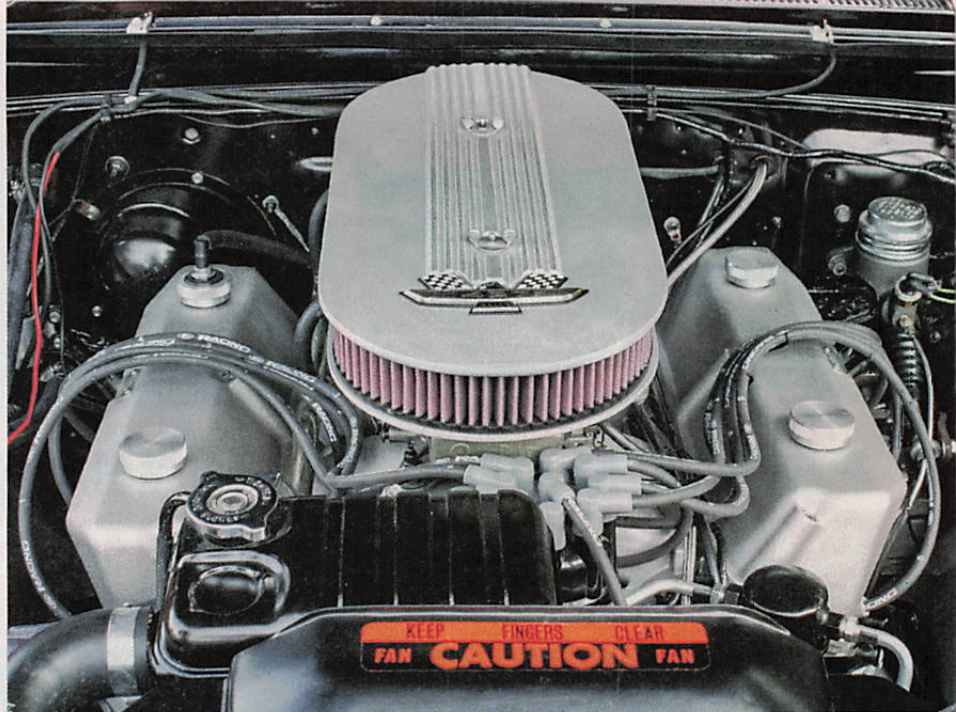


TWO DECADE DEVOTION

The FE family of engines are finally experiencing decent aftermarket support, and despite Stan's desire to keep the Galaxie "old school," he couldn't resist taking advantage of current technology available for the big-block Ford. First, he had Blair Patrick prep a set of Bear Block Motors aluminum cylinder heads and paired them with a radical looking BBM Tunnel Wedge intake. The latter is a near reproduction of Ford's race intake that was sold over the counter beginning in 1968. It's a single plane dual-quad with runners that look much like a Tunnel Port 427 intake, yet it has traditional FE port configuration.

Stan had the original center-oiler block sonic checked and bored 0.040-inch over. He installed a Scat stroker kit with a 4.25-inch crank, H-beam rods, and Mahle pistons that net a 10.8:1 compression ratio. FPA headers are a given, but the cam was a unique choice motivated by a desire for something that sounded a little short of a Super Stocker, yet wouldn't annihilate the valvetrain of a car destined for street use. The end result is a custom Bullet roller cam that has a ton of duration but only modest lift in order to keep spring pressures at a reliable level. Stan is quick to say he wouldn't necessarily recommend this combination for a customer interested in max power or drivability, but it met his own agenda perfectly for power and presence.

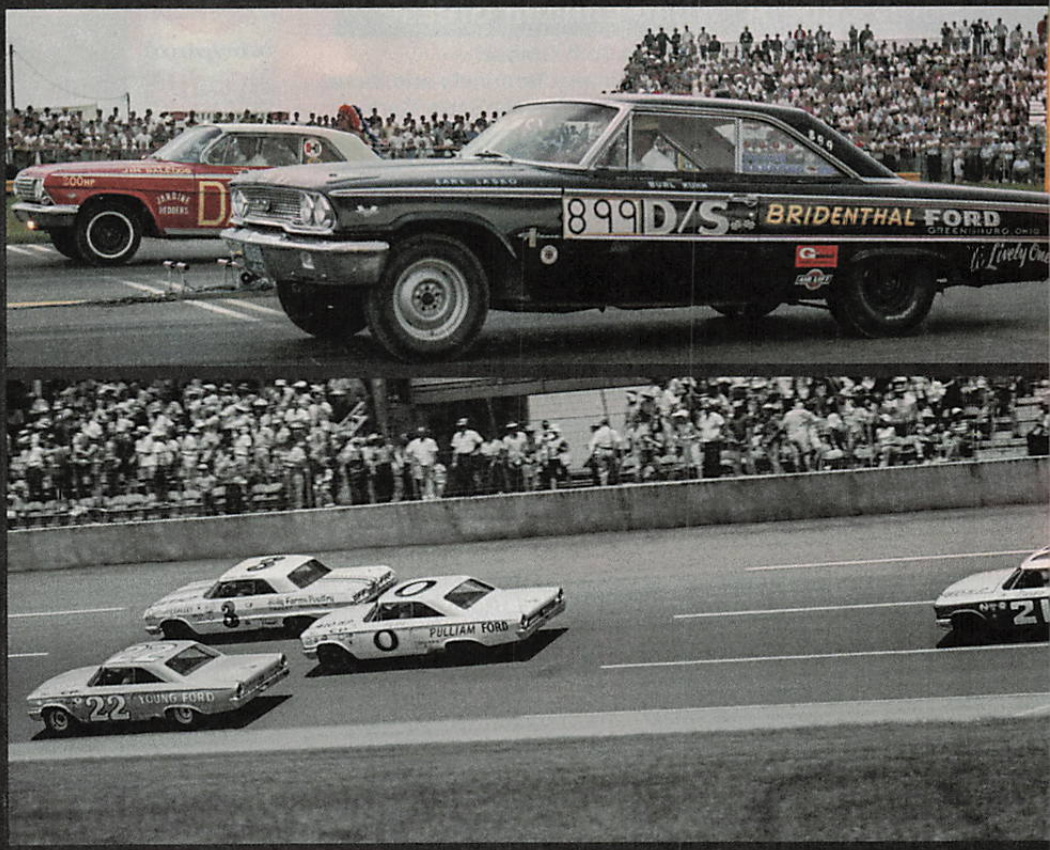
Now equipped with 487 cubes, a four-speed, and 4.11 gears, the Galaxie boasts plenty of beast to go along with its beautiful fastback bodylines. Stan explained that he's still working to get the off-idle transition dialed in and to his liking. "With the twin Holleys and single-plane intake—let's just say you've got to drive it like a hot rod," he says. 



Fast Fastbacks

In NASCAR, Fords won more races in 1963 than any other manufacturer: 23 compared to the next-best Plymouth with 19. Dan Gurney got things off to a good start by winning the first major race of the season—the Riverside 500—in a Galaxie, followed by Tiny Lund winning the Daytona 500. Over in USAC, Don White won the driver's championship in his '63½ Galaxie.

Ford was serious about making a splash in drag racing with the new fastback Galaxie, so they built 200 lightweight units that used fiberglass front fenders, inner fenders, hood and decklid, aluminum bumpers, lightweight Bostrom buckets, and much more. The cars were very competitive in the Super Stock ranks, though not exactly world beaters. Various class and track records were recorded that year by such drivers as Dick Brannan, Gas Ronda, Al Joniec, Bill Lawton and others. Perhaps the '63½ lightweight's biggest performance wasn't technically even a win. At the 1963 Nationals the Ed Martin Galaxie went to the Super Stock finals against a Dodge driven by John Barker, and lost. Teardown of the winning 426 found an illegal cam, and it was disqualified, however, NHRA didn't elevate the runner-up to "winner" status at the time. We know better.

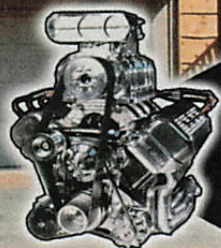


Specializing in '51-'58 Chrysler, Dodge and Desoto Hemi's.
For Quality Products and Knowledgeable Advice

HOT HEADS
RESEARCH & RACING, INC.

**The Leader in early HEMI parts development. All
Hot Head manufactured parts are made in the USA.**

Complete Line
of Rebuild &
Dress Up Parts
In Stock



Bob Walker, owner, serving
HEMI engine fans since 1992

HOT HEADS
RESEARCH & RACING, INC.

Visit our free strickly
swap meet at www.hothemiheads.com

HEMI

Phone: (336) 352-4866 • Fax: (336) 352-3892

Portable Car Lift for Home Use

The MaxJax portable two-post lift is one of the most versatile DIY tools ever invented. Its patented design allows you to get full-sized lift advantages in spaces with limited ceiling heights. Best of all, MaxJax is completely portable and can be setup virtually anywhere. For more info call 1-844-629-5291 or visit MaxJax.com.



See it on
YouTube

1. Roll It



2. Work It



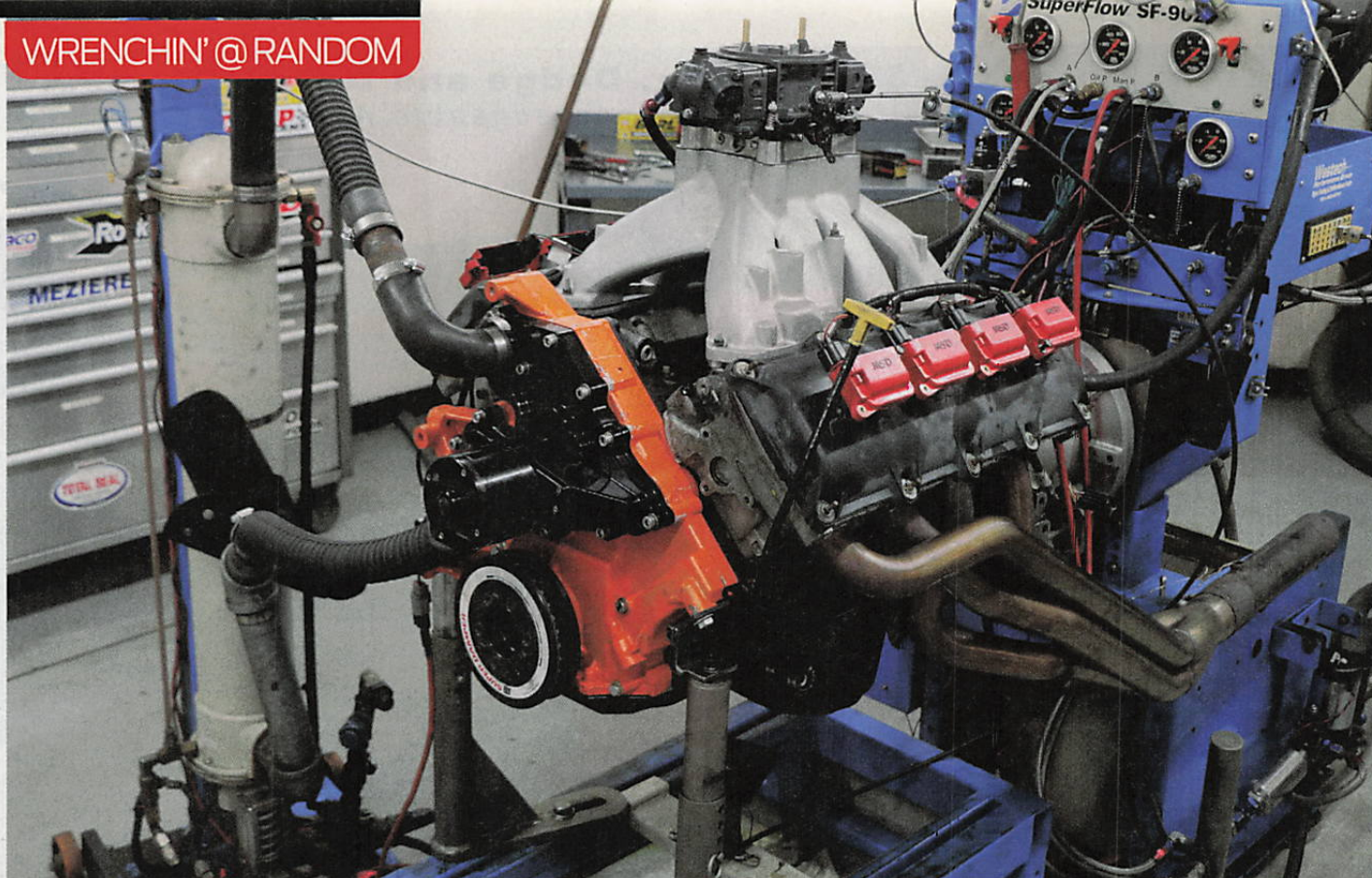
3. Stow It



1-844-629-5291 • www.MaxJax.com

©2020 MaxJax, LLC, a subsidiary of BendPak Inc. The MaxJax is protected by one or more patents or claims of patents in the U.S. and elsewhere. PATENT NO. US 8,256,577 B2 - PATENT NO. US 9,150,395 B2.

MAXJAX®



Homeless Hemi, **Part 4:** How Does Intake Manifold Design Affect the Power Curve?

WE TEST A STOCK INTAKE AGAINST THE DRAG PACK SINGLE PLANE INTAKE WITH A CARBURETOR. GUESS WHICH ONE MAKES MORE POWER.

✍️📷 Richard Holdener

So far in the build of this neglected 5.7L Hemi, we got the engine running to establish a baseline of 376 hp and 414 lb-ft. Next, we changed the cam and springs, and on Westech's Superflow engine dyno, we saw power jump to 434 hp and 440 lb-ft. After that, we experimented with different header designs, settling on a set of Hooker 1 $\frac{1}{8}$ -inch long-tube headers with 3-inch collectors, which bumped the power up to 442 hp at 6,200 rpm and just slightly reduced torque output to 437 lb-ft at 4,500 rpm.

Now, we turn our attention to the induction side. The intake and exhaust are often thought of as independent entities, but the reality is they not only have much in common, but they are also interdependent.

As we saw in the header testing, the primary tube length played a major role in shaping the torque curve. Differing

primary tube lengths and diameters influence the scavenging effect of the exhaust pressure waves to not only evacuate exhaust gases from the combustion chamber, but to also help draw charge air from the induction system. Naturally, this occurs during the overlap phase, where the intake and exhaust valves are open.

On the induction side, things like runner length, diameter, and taper play a major part in torque production. Much like the primary length in the headers, longer runners help promote torque production, especially at lower engine speeds. The important thing to remember is that intake manifolds are rpm specific, meaning they are designed to be efficient over a specific rpm range. The shorter the runners, the higher the tuned engine speed. The longer the runners, the lower the optimum engine speed.

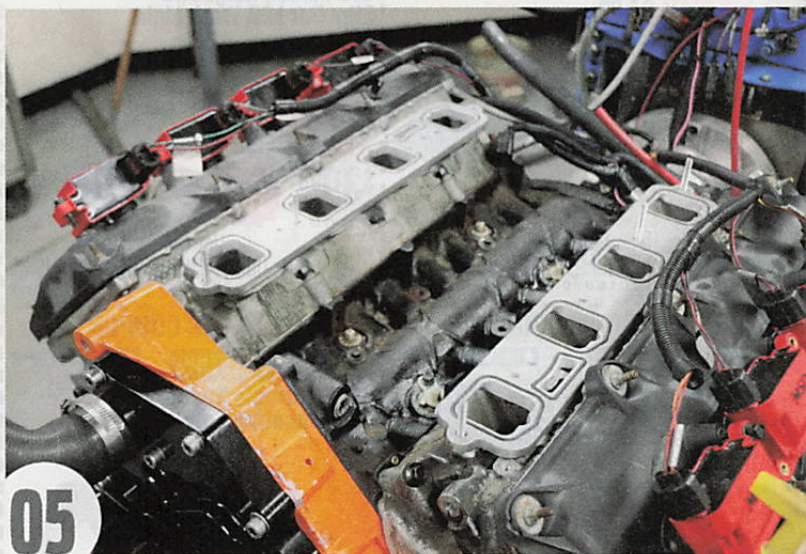
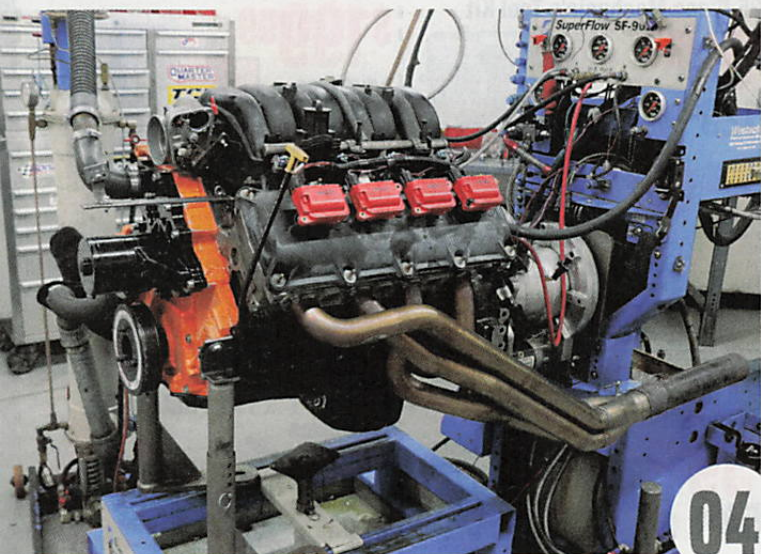
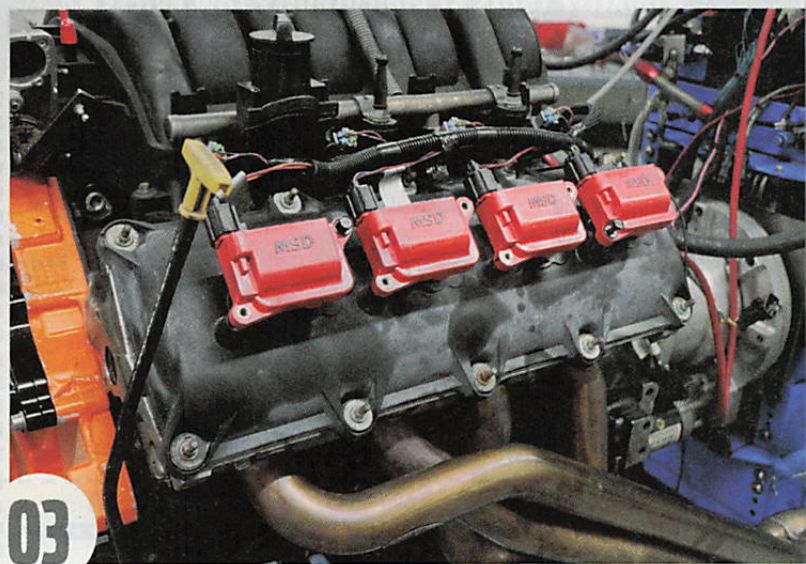
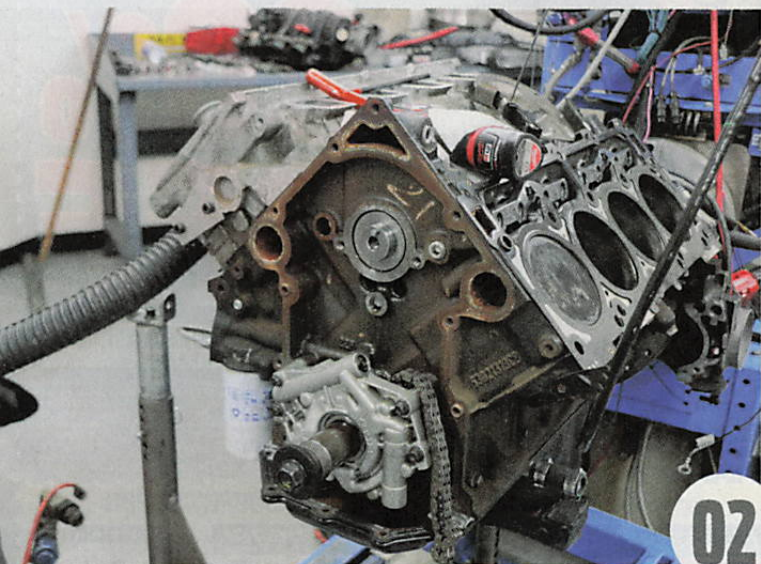
01 To illustrate this point, we decided to compare an OE Magnum/300C intake against the radically different Mopar Performance Drag Pack intake. You couldn't get much different than the stock port fuel injected manifold with its long runners, and the tall, carbureted single plane designed for drag racing. As the results show, the Drag Pack intake was obviously designed for a much more radical combination than our mild 5.7L.

Sources

Comp Cams 800.365.9145
Compcams.com

Holley/Hooker/MSD
866.464.6553
www.holley.com





02 To review the specs of the engine, this is an early Gen III Hemi that came out of a Ram pickup. We ditched the MDS cam and lifters, and installed Comp's HRT Stage 2 cam with 220/230 degrees of duration at 0.050 inch tappet lift and 0.596/0.582 valve lift with a 113-degree lobe separation angle.

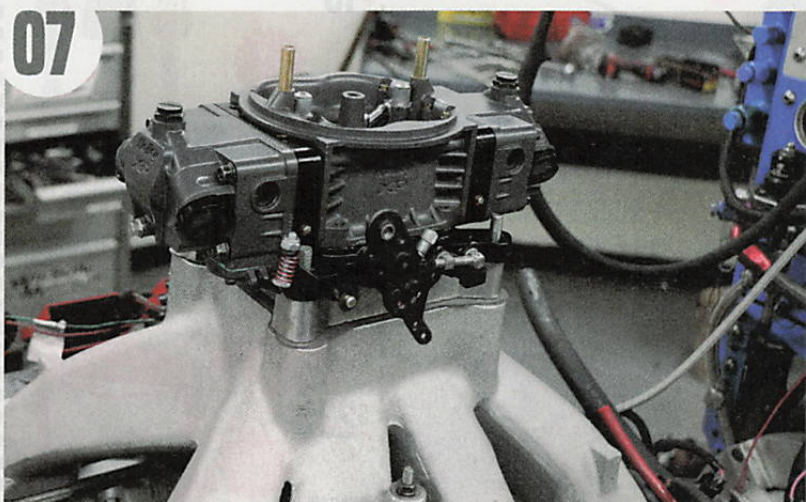
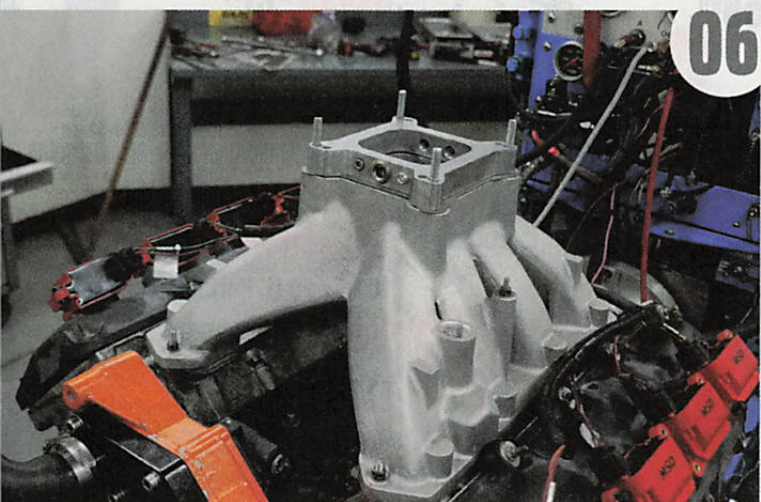
03 For all the EFI testing we have done so far, we've used Holley's HP management system and MSD ignition coils.

04 For this round of testing, we ran the engine with Hooker's 1 7/8-inch long-tube headers. With the Magnum intake installed, the Hemi produced 442 hp at 6,100 rpm and 437 lb-ft of torque at 4,500 rpm. This long-runner composite intake is our first choice for a street application, despite the fact that the aluminum SRT8 intake does offer slightly more peak power, though at the cost of low-speed torque.

05 With our EFI baseline done, it was time for some carburetion, so we removed the Magnum intake and prepared to drop on the Drag Pack manifold. It required adaptors between it and our early Gen III heads.

06 Because the intake has no provisions for vacuum ports, we installed this 1/2-inch open spacer equipped with fittings for our map sensor.

07 Topped with a Holley 650 cfm Ultra XP carburetor, the engine made 443 hp at 6,200 rpm and 409 lb-ft of torque at 5,300 rpm. For those of you thinking we went too small with the carburetor, think again. We tried a larger 750 cfm carburetor, and the result was no extra peak power and a loss in power below 5,000 rpm.



HARBOR FREIGHT

QUALITY TOOLS AT RIDICULOUSLY LOW PRICES

Shop When You Need To Online & In-Store

SUPER COUPON

★★★★★ (1304)

EARTHQUAKE XT

20v Lithium-Ion
1/2" Extreme Torque
Impact Wrench Kits

1/2" Anvil
ITEM 63537/64195
63852 shown

2" Extended Anvil
ITEM 64349

Compare to
Snap-on CT8850PDB,
CT88185BK, CTC720
\$724.95

Use Online & In-Store

52010539 LIMIT 1 - Exp. 10/5/20

1200 TORQUE
FT. LBS.
VOLT BREAKAWAY

YOUR CHOICE
\$229⁹⁹
~~\$269⁹⁹~~
Save \$49.4



Includes
battery and
charger.

WOW! SUPER COUPON

SAVE 89%

4" Magnetic Parts Holder

★★★★★ (6308)

LIMIT 3



WOW!
63¢
~~\$2.99~~

Compare to
Titan 11194
\$5.99
ITEM 62535
90566 shown

Hardware sold separately.
Use Online & In-Store

52016698 Exp. 10/5/20

SUPER COUPON

20% OFF
ANY SINGLE ITEM*

52000430

Limit 1 coupon per customer per day. Save 20% on any 1 item purchased. *Cannot be used with other discount, coupon or any of the following items or brands: Inside Track Club membership, Extended Service Plan, gift card, open box item, 3 day Parking Lot Sale item, compressors, floor jacks, power stations, sales, storage cabinets, chains or carls, trailers, welders, Aqualux, Ames, Atlas, Bauer, Control Machinery, Cobra, CoverPro, Dayluna, Diamondback, Earthquake, Fischer, Hercules, Icon, Jupiter, Lynx, Pouch, Predator, Tangle, Tangle, Vacuum, Zurich. Not valid on prior purchases. Non-transferable. Original coupon must be presented. Valid through 10/5/20.

SUPER COUPON

★★★★★ (2111)

7 ft. 4" x 9 ft. 6"
All Purpose/Weather Resistant Tarp

\$299
~~\$499~~

Save 65%

Compare to
Blue Hawk
BG8X10-Y
\$8.78
ITEM 69115/69121
69125/69137/69249
877 shown

Use Online & In-Store

52016970 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (4474)

BRAUN
390 Lumen Magnetic
Slim Bar LED Work Light

\$269⁹⁹
~~\$399⁹⁹~~
Save 51%

Compare to
Astro
40SL
\$55.12
ITEM 54329
56248/63958 shown

Use Online & In-Store

52026440 LIMIT 2 - Exp. 10/5/20



SUPER COUPON

★★★★★ (541)

PITTSBURGH
LIFETIME WARRANTY
225 Piece Mechanic's Tool Kit

\$99⁹⁹
~~\$129⁹⁹~~
Save \$175

Compare to
Klutch
48101
\$274.99
ITEM 64367
62644 shown

Use Online & In-Store

52030416 LIMIT 2 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1533)

U.S. GENERAL
30", 5 Drawer Mechanic's Cart

\$199⁹⁹
~~\$239⁹⁹~~
Save \$630

Compare to
Snap-On
Blue-Point
KRBC10TBPS
\$830
ITEM 64031, 64722,
64033, 64721, 64039,
64720, 56429

Use Online & In-Store

52033970 LIMIT 1 - Exp. 10/5/20



SUPER COUPON

★★★★★ (2264)

CENTRAL
MACHINERY
8", 5 Speed
Benchtop
Drill Press

\$549⁹⁹
~~\$699⁹⁹~~
Save 31%

Compare to
WEN 4208
\$79.97
ITEM 62520
60238 shown

Use Online & In-Store

52034885 LIMIT 1 - Exp. 10/5/20



SUPER COUPON

★★★★★ (4664)

CHICAGO ELECTRIC
POWER TOOLS
6 AMP Variable Speed
Reciprocating Saw

\$199⁹⁹
~~\$279⁹⁹~~
Save 66%

Compare to
Porter-Cable
PCE380
\$59.98
ITEM 61884
65570/62370 shown

Use Online & In-Store

52035780 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1382)

PITTSBURGH
1500 lb. Capacity Vehicle Dollies
2 Piece Set

\$399⁹⁹
~~\$549⁹⁹~~
Save 55%

Compare to
Roughneck
27918
\$89.99
ITEM 60343
67338 shown

Use Online & In-Store

52038611 LIMIT 2 - Exp. 10/5/20



SUPER COUPON

★★★★★ (5053)

HaulMaster
4 Piece, 1" x 15 ft. Ratcheting
Tie Downs

\$699
~~\$1299~~
Save 69%

Compare to
Keeper
5505
\$22.80
ITEM 62054
62657/63150
56648/63094 shown

Use Online & In-Store

52042912 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1845)

PITTSBURGH PRO
LIFETIME WARRANTY
1/2" Drive, 25"
Breaker Bar

\$899
~~\$1399~~
Save 62%

Compare to
Duralast
72-121
\$23.99
ITEM 60819
67933 shown

Use Online & In-Store

52048919 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1971)

WARRIOR
3 Piece Titanium
Step Bit Set

\$899
~~\$1399~~
Save 85%

Compare to
Irwin
15504PKSM
\$59.98
ITEM 69087
60379/91616 shown

Use Online & In-Store

52054987 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1176)

CHICAGO ELECTRIC
WELDING
Adjustable Steel
Welding Table

\$549⁹⁹
~~\$699⁹⁹~~
Save \$85

Compare to
Strong Hand Tools
TS3020
\$139.99
ITEM 63069
61369 shown

Use Online & In-Store

52063917 LIMIT 2 - Exp. 10/5/20



SUPER COUPON

★★★★★ (2808)

HARDY
9 mil Industrial Strength
Powder-Free
Nitrile Gloves
Pack of 50

\$999
~~\$1399~~
Save 48%

Compare to
Grease Monkey
23555-110/23555
\$19.49
ITEM 64510,
61742, 68511,
61744, 61743,
68512 shown

Use Online & In-Store

52067117 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (2934)

4 Piece Anti-Fatigue
Foam Mat Set

\$699
~~\$899~~
Save 65%

Compare to
Norsk
001119346
\$19.99
ITEM 40187/61407
62389/94635 shown

Use Online & In-Store

52069926 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (168)

CENTRAL
MACHINERY
36" Metal Brake with
Stand

\$189⁹⁹
~~\$239⁹⁹~~
Save \$307

Compare to
Black Bull
BK36
\$497.08
ITEM 62518
62335
91012 shown

Use Online & In-Store

52070093 LIMIT 1 - Exp. 10/5/20



SUPER COUPON

★★★★★ (3570)

4 Piece Funnel Set

79¢
~~\$1.24~~
Save 86%

Compare to
Tekton
6093
\$6.04
ITEM 61941/744 shown

Use Online & In-Store

52071403 LIMIT 4 - Exp. 10/5/20



SUPER COUPON

★★★★★ (1223)

COVERPRO
10 ft. x 20 ft. Portable Car Canopy

\$949⁹⁹
~~\$1199⁹⁹~~
Save \$104

Compare to
Shelter Logic 23522
\$199
ITEM 63054
62838 shown

Use Online & In-Store

52073342 LIMIT 1 - Exp. 10/5/20



SCISSOR SUPER COUPON

PITTSBURGH SERIES 2 ★★★★★ (587)

***1 SELLING JACKS IN AMERICA**

Rapid Pump® 3 Ton Steel Heavy Duty Floor Jack

\$89⁹⁹

~~\$99⁹⁹~~

Save \$45

Compare to Powerbuilt 647593 \$135.27
ITEM 54621/54622 54623/54624 shown

Use Online & In-Store

52075684 LIMIT 2 - Exp. 10/5/20

SCISSOR SUPER COUPON

HaulMaster ★★★★★ (1238)

3/8" x 14 ft., Grade 43 Towing Chain

\$19⁹⁹

~~\$39⁹⁹~~

Save 69%

Compare to Milbro 426920 \$64.99
ITEM 40462/40458 97711 shown

Use Online & In-Store

52075938 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

CHICAGO ELECTRIC WELDING ★★★★★ (1511)

Flux 125 Welder

\$129⁹⁹

~~\$99⁹⁹~~

Save \$80

Compare to Ironon 45433 \$179.99
ITEM 63583 63582 shown

Use Online & In-Store

52076702 LIMIT 1 - Exp. 10/5/20

BETTER Professional Performance TITANIUM ★★★★★ (871)

Easy Flux 125 Welder

\$179⁹⁹

~~\$109⁹⁹~~

Save \$259

Compare to Lincoln Electric K2513-1 \$439
ITEM 54359 54355 shown

Use Online & In-Store

52086753 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

MADDOX ★★★★★ (1064)

Ball Joint Service Kit for 2WD and 4WD Vehicles

\$59⁹⁹

~~\$89⁹⁹~~

Save \$99

Compare to Powerbuilt 940579 \$158.99
ITEM 63276/64399 63258/63610 shown

Use Online & In-Store

52087158 LIMIT 2 - Exp. 10/5/20

SCISSOR SUPER COUPON

PITTSBURGH ★★★★★ (354)

2000 lb. Capacity Foldable Engine Stand

\$109⁹⁹

~~\$134⁹⁹~~

Save \$110

Compare to Strongway 47032 \$219.99
ITEM 69521 69522 shown

Use Online & In-Store

52087333 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

PITTSBURGH ★★★★★ (2179)

Low-Profile Creeper

\$19⁹⁹

~~\$29⁹⁹~~

Save 55%

Compare to Power Torque GM40300 \$44.99
ITEM 63371 63424/64169 63372 shown

Use Online & In-Store

52090107 LIMIT 3 - Exp. 10/5/20

SCISSOR SUPER COUPON

CHICAGO ELECTRIC WELDING ★★★★★ (2694)

MIG/Flux Welding Cart

\$29⁹⁹

~~\$39⁹⁹~~

Save \$70

Welders, tools & supplies sold separately.

Compare to Forney 17535099 \$99.99
ITEM 61316 60790 69340 shown

Use Online & In-Store

52094534 LIMIT 2 - Exp. 10/5/20

SCISSOR SUPER COUPON

McGRAW ★★★★★ (529)

8 Gallon, 150 PSI Oil-Free Air Compressor

\$119⁹⁹

~~\$139⁹⁹~~

Save \$39

Compare to Kobalt 300841 \$159
ITEM 54269 64294 shown

Use Online & In-Store

52099238 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

Kenway ★★★★★ (709)

12v LED Magnetic Towing Light Kit

\$22⁹⁹

~~\$34⁹⁹~~

Save 46%

Compare to Blazer C7300 \$42.65
ITEM 64282

Use Online & In-Store

52106009 LIMIT 2 - Exp. 10/5/20

SCISSOR SUPER COUPON

PORTLAND ★★★★★ (5604)

1750 PSI Electric Pressure Washer

\$79⁹⁹

~~\$99⁹⁹~~

Save \$94

Compare to Briggs & Stratton 20600 \$174.44
ITEM 63255 63254 shown

Use Online & In-Store

52107342 LIMIT 2 - Exp. 10/5/20

SCISSOR SUPER COUPON

VOYAGER ★★★★★ (4253)

12" Tool Bag with 21 Pockets

\$4⁹⁹

~~\$8⁹⁹~~

Save 75%

Tools sold separately.

Compare to AWP 3L-2216 \$19.98
ITEM 38168/42163 62349/61467 shown

Use Online & In-Store

52109441 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

EARTHQUAKE XT ★★★★★ (1155)

12v Lithium-Ion 3/8" Extreme Torque Ratchet Kit

\$99⁹⁹

~~\$129⁹⁹~~

Save \$145

Compare to Snap-on CTR761CDB \$245.95
ITEM 64196/54640/63538 shown

Use Online & In-Store

52111728 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

Heavy Duty Foldable Aluminum Sports Chairs

\$19⁹⁹

~~\$29⁹⁹~~

Save 50%

YOUR CHOICE OF COLOR

Green ITEM 62046/62314 shown
Blue ITEM 54719

Compare to Coleman 635394 \$39.99
ITEM 62344/64685 93897 shown

Use Online & In-Store

52111780 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

CENTECH ★★★★★ (3787)

Automatic Battery Float Charger

\$4⁹⁹

~~\$9⁹⁹~~

Save 83%

Compare to Schumacher Electric SC1 \$30.41
ITEM 64284 69555 42292 shown

Use Online & In-Store

52111839 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

Bauer ★★★★★ (957)

5" Deep Cut Variable Speed Band Saw

\$99⁹⁹

~~\$134⁹⁹~~

Save \$169

Blade sold separately.

Compare to Dewalt DWM120 \$269.96
ITEM 64194/63763 63444 shown

Use Online & In-Store

52116662 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

WARRIOR ★★★★★ (79)

1500w Dual Temperature Heat Gun (700°-1000°)

\$8⁹⁹

~~\$14⁹⁹~~

Save 67%

Compare to BLACK + DECKER HG1300 \$28.06
ITEM 54433 54434 shown

Use Online & In-Store

52118634 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

CENTRAL PNEUMATIC ★★★★★ (1579)

3/8" x 50 ft. Retractable Air Hose Reel

\$59⁹⁹

~~\$79⁹⁹~~

Save \$39

Compare to Kobalt SGY-AIR184 \$99
ITEM 62344/64685 93897 shown

Use Online & In-Store

52123778 LIMIT 1 - Exp. 10/5/20

SCISSOR SUPER COUPON

CENTRAL MACHINERY ★★★★★ (3162)

350 lb. Capacity Foldable Sawhorse

\$8⁹⁹

~~\$12⁹⁹~~

Save 50%

Compare to Stanley STST11200 \$17.99
ITEM 60710 61979 shown

Use Online & In-Store

52134791 LIMIT 4 - Exp. 10/5/20

SCISSOR SUPER COUPON

Bauer ★★★★★ (258)

6", 5.7 AMP Variable Speed Dual Action Polisher

\$59⁹⁹

~~\$79⁹⁹~~

Save \$69

Compare to Porter-Cable 7346SP \$129
ITEM 64529 64528 shown

Use Online & In-Store

52138693 LIMIT 2 - Exp. 10/5/20

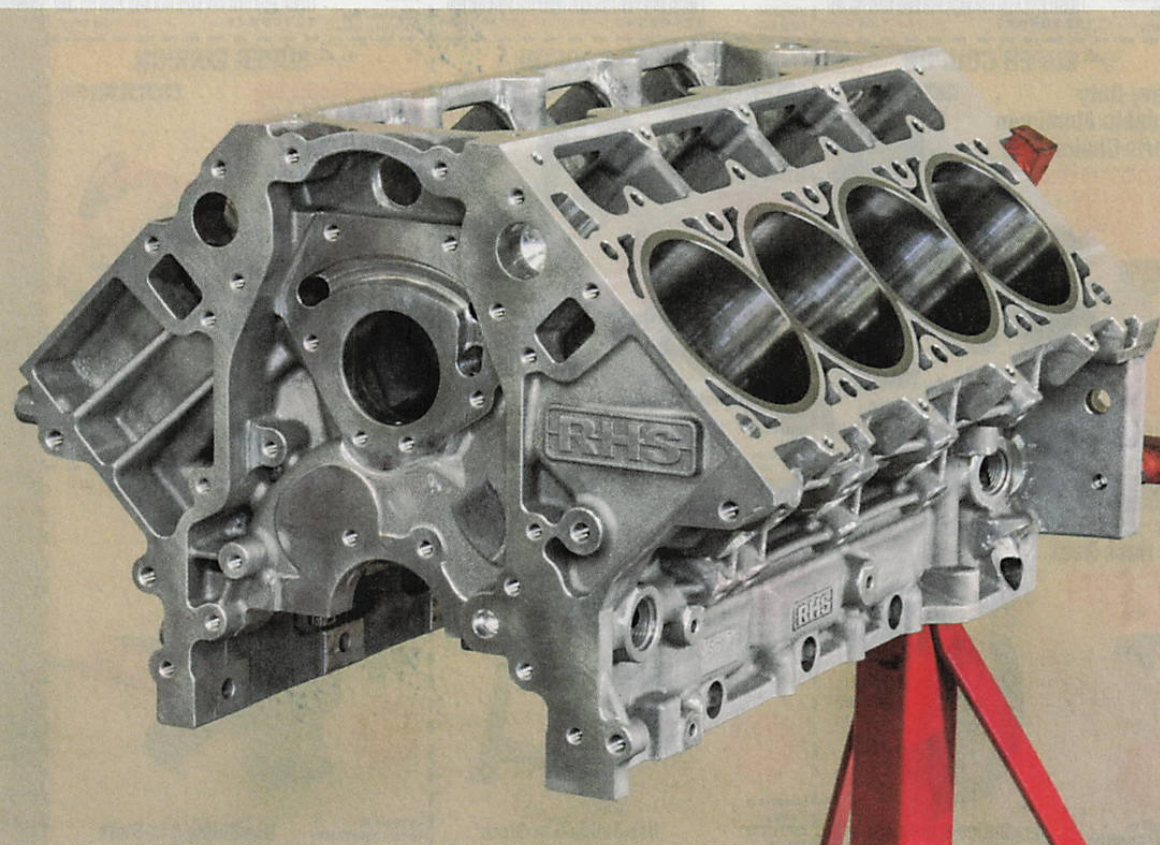
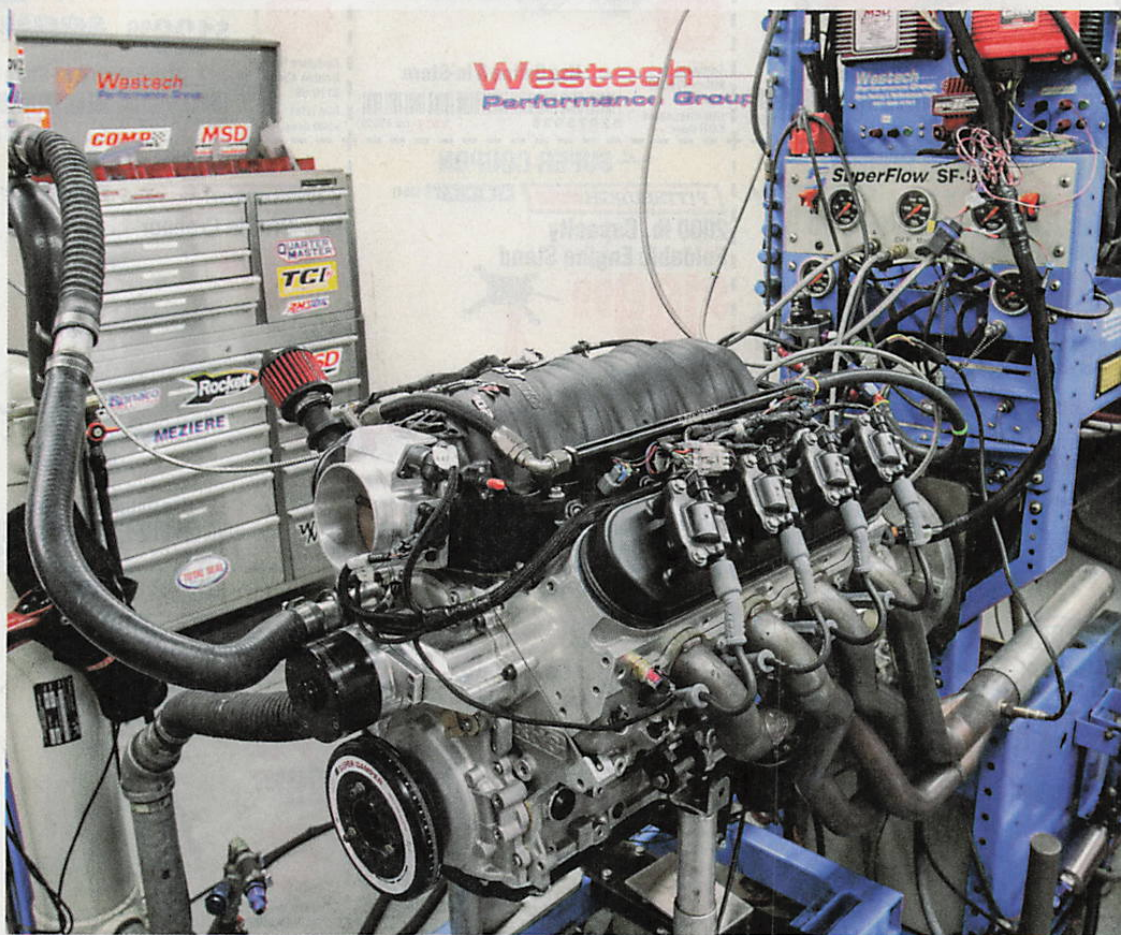
Supersize Me

✍️📷 Steven Rupp

This 440-Cubic-Inch LS is a Street-Friendly Torque Monster

When deciding on an engine build for a project, the key factor is how that car will be used. While a drag car might be all about top-end power, a street car will be the exact opposite. If your plan is a Pro-Touring car that will drive on the street, yet be able to tackle road and autocross courses, then you need an engine that can do a little bit of everything well.

In our case, we needed an engine for our 1968 Camaro project called Track Rat. We wanted gobs of low-end grunt to pull us out of tight corners and around cones at lower speeds. Sure, we wanted top-end power for the straights, but we couldn't sacrifice street manners since this wasn't going to be a trailer queen. We also wanted to stay naturally aspirated, so that meant our formula had to include added displacement. After crunching the numbers, we came up with a 440-inch LS (4.125-inch bore x 4.125-inch stroke) based on RHS' aftermarket block.



Sources

ARP; 800.826.3045; arp-bolts.com

ATI Performance Products;
877.298.5039; atiracing.com

Brodix; 479.394.1075; brodix.com

C.H.E. Precision Inc.; 805.499.8889;
cheprecision.com

Comp Cams; 800.999.0853;
compcams.com

FAST; 877.334.8355; fuelairspark.com

Fel-Pro; 800.325.8886; felpro.com

Improved Racing; 407.705.3054;
improvedracing.com

Holley Performance Products;
866.464.6553; holley.com

Lucas Oil Products; 800.342.2512;
lucasoil.com

Lunati; 662.892.1500; lunatipower.com

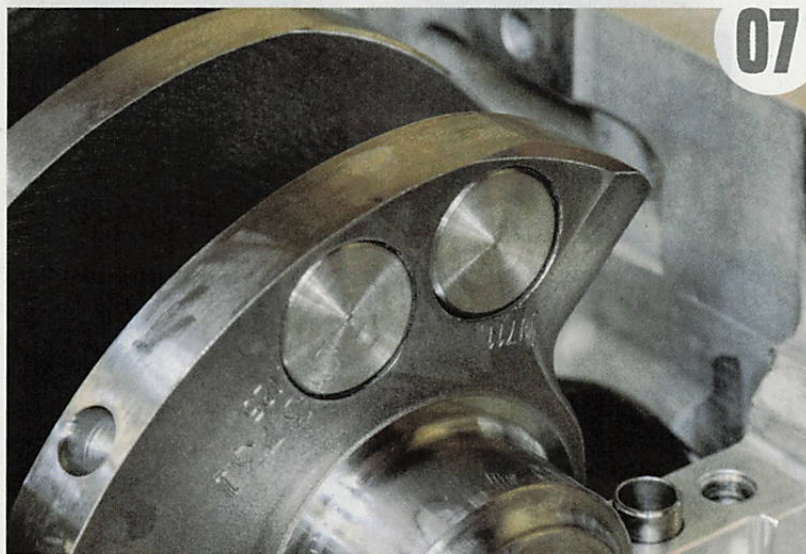
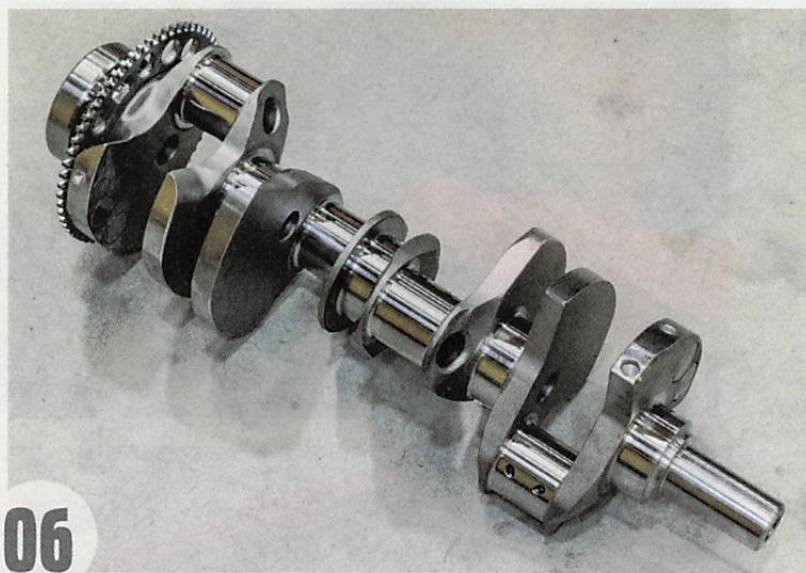
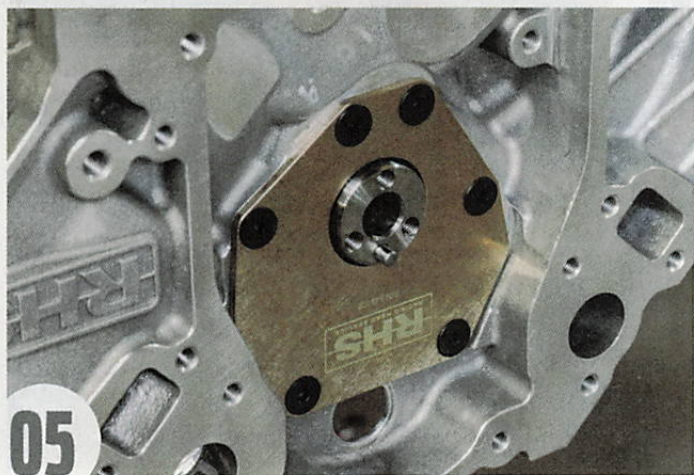
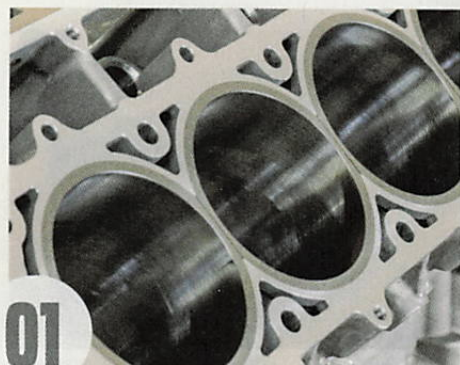
Mahle Motorsport; 888.255.1942;
us.mahle.com

Meziere Enterprises; 800.208.1755;
meziere.com

MSD Performance Products;
888.258.3835; holley.com

Racing Head Service (RHS);
877.776.4323; racingheadservice.com

Westech Performance Group;
951.685.4767; westechperformance.com



01 With its raised cam tunnel and long sleeves, this block was built for stroker applications. RHS also improved oil control through the block and incorporated features like motor plate race mounts for the hardcore crowd and provisions to easily add a dry-sump oiling system. Should you want more displacement, RHS also offers a tall-deck version that is engineered to accept up to a 4.600-inch crank. Combine that with the RHS block's maximum bore of 4.165-inch, and you get the potential for 501 cubes, or 8.2L.

02 The RHS blocks are automotive works of art. Made using a Clean Cast Technology and A357-T6 aluminum, they arrive with an excellent finish. The blocks are dry-sump ready with provisions for AN-12 feeds at the front and rear. Every block is CT scanned by RHS to save you hassles down the road. For extra strength, all the threaded holes have rolled threads and the block came to us already deburred.

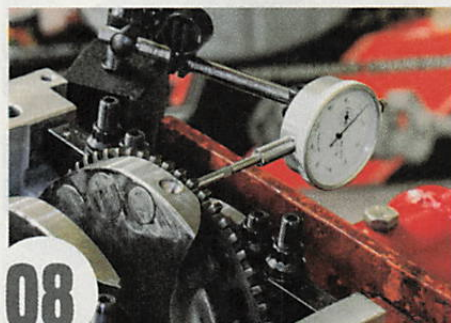
03 For additional strength RHS maximized the main cap surface area and incorporated large fillets from the cap to the cross bolts. All the billet main caps are doweled for stability, and the block ships from RHS with ARP main hardware.

04 Having more cubes means we could suck up a bigger cam without suffering any ill effects on the street. Given this, we went with a custom grind from Comp (PN 54-000-11) that had duration of 235/254, lift of 0.610/0.596, and an LSA of 113+4. In a smaller engine this would be a big cam, but in the 440 it should strike a nice balance.

05 The RHS block does require a proprietary cam thrust plate, but they are nice enough to include this bronze beauty with the block.

06 The Lunati Pro Series crank (PN 60841251) was so pretty it was a shame to hide it inside the engine. Machined from 4340 steel, this crank will easily handle the abuse we plan to heap upon it. The journal radii are ground to 0.140 inch, roundness of each journal is .0001 inch or less, and each rod journal incorporates a lightening hole to reduce inertia weight. RHS standard-deck blocks can handle a lot of stroke (up to 4.25-inch), but we opted for 4.125-inch as a balance between rpm and displacement.

07 The bigger the stroke, the more critical, and difficult, balancing becomes. For this we had the experts at Lunati balance the rotating kit, and here's just some of the Mallory metal used to help balance the rotating assembly.



08



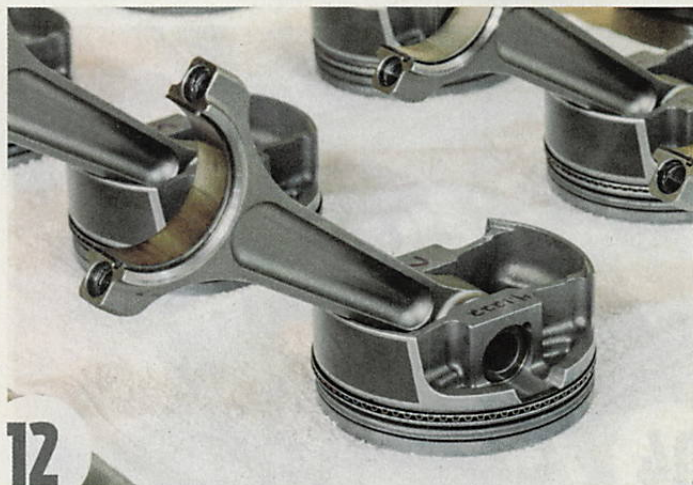
09



10



11



12

08 Checking crank thrust is always a good idea, and Chris Pollock at Evod Garage in Escondido, California, made sure we were right on target. At first we had nearly zero thrust (it can be anywhere from 0.003 to 0.010 inch), but Chris was able to get us to 0.004 inch. With a manual transmission, it's better to be on the tighter side.

09 The badass crank meant we needed equally badass rods. Lunati's I-beam 4340 rods can take the abuse. These 6.125-inch rods (PN JP6125-8) weighed in at 637 grams (rotating weight of 455 grams), and we opted to upgrade them to the stronger ARP 2000 rod bolts.

10 Buy sticking with a common bore of 4.125 inches (same as an LS7), we had a plethora of piston choices. We opted for a full set of Mahle forged slugs (PN LSX045125F08). The flat-top design (with two valve reliefs) would get us right in the 10.9:1 compression range with the heads we chose. Like all Mahle pistons we use, these came fully coated with a dry phosphate to protect against ring micro-welding and galling on start-up. They also had a Grafal anti-friction coating on the skirts.

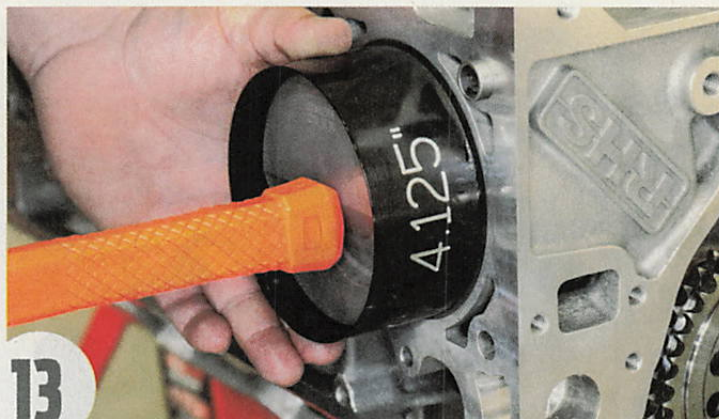
11 Chris then went about the tedious but necessary task of file fitting the rings using his Summit Racing hand file. These were the plasma moly rings included with the pistons.

12 The wrist pins are retained with wire locks, and once installed our pistons were mated to the Lunati rods. Notice the writing on the pistons? Chris matched each piston combo with a corresponding cylinder. For bearings we went with Clevite for the rods and mains.

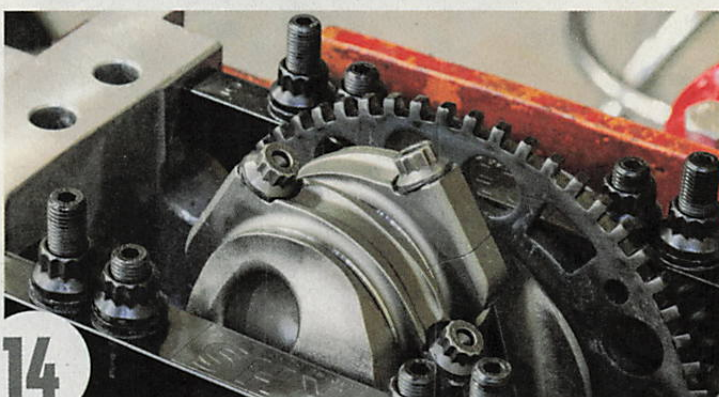
13 It was then time to slide the piston/rod assemblies into the RHS block using our ARP ring compressor (PN 900-1250). The RHS block's Siamese cylinder design can go from 4.100 to 4.165 inches in bore and comes with pressed-in spun-cast liners measuring 5.87 inches for standard and 6.38 inches for tall decks. The blocks also incorporate improved bay-to-bay breathing compared to factory LS blocks.

14 With the rotating bits installed, we could torque down all the APR hardware and double-check that everything was just as it should be.

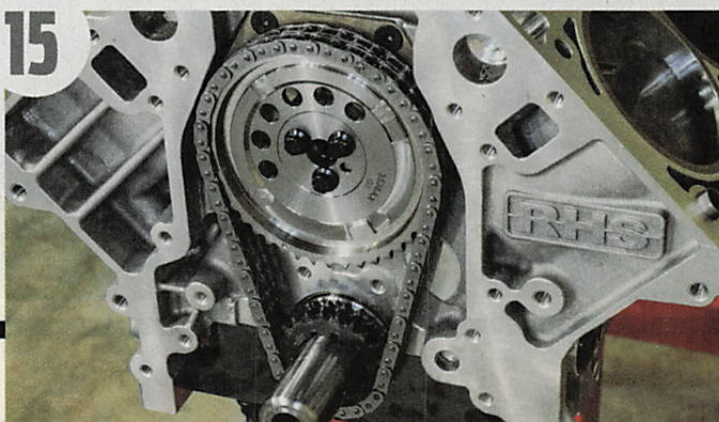
15 To keep it all timed properly, we went with a Lunati keyway-adjustable billet timing set (PN 95536). The pre-stretched double-roller chain is more than strong enough, and the kit offers four degrees of advance or retard. The chain also had an extra link to accommodate the raised cam design of the RHS block.



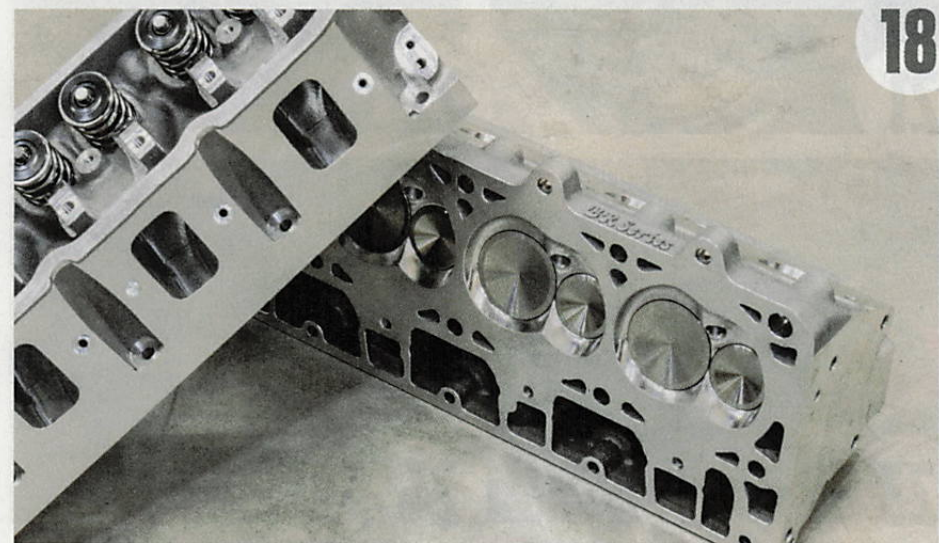
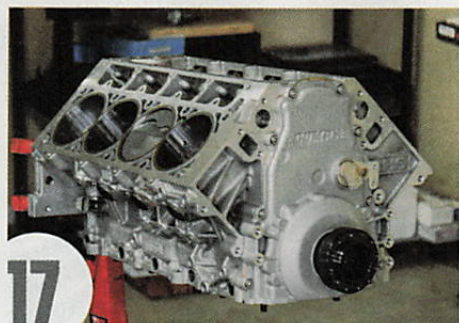
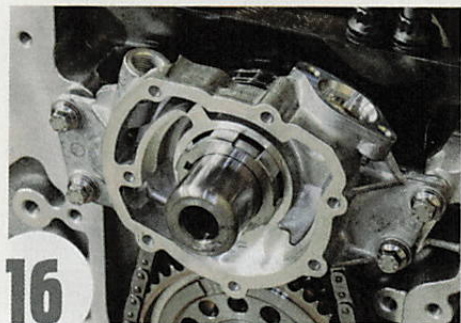
13



14



15



16 Chris is very meticulous about how he installs oil pumps. His trick is to take it apart and build it in place so he can use a feeler gauge to make sure it's properly centered on the crank snout.

17 After adding the Comp double-roller-ready front timing cover (PN 5495) and our honed ATI damper hub (PN 917083), our short-block was officially done.

18 To keep the air flow feeding our hungry 440, we went with a pair of Brodix BP BR 3 LS3-style CNC ported heads (PN 1173700). These featured 280cc intake ports that are rated over 363 cfm. They also utilize a 15-degree valve angle with 71cc chambers and a 2.165/1.590-inch valve combination.

19 After putting the Fel-Pro PermaTorque MLS head gaskets in place, we installed the Brodix heads using an ARP head stud kit (PN 234-4339).

20 When rpm is part of the plan, you don't want to skimp on lifters. For the 440 we went with



Comp full-travel hydraulic roller lifters (PN 8957-16). These link-bar lifters are specified for aftermarket blocks like our RHS unit. They are lightweight and made from heat-treated 52100 steel for better wear resistance.



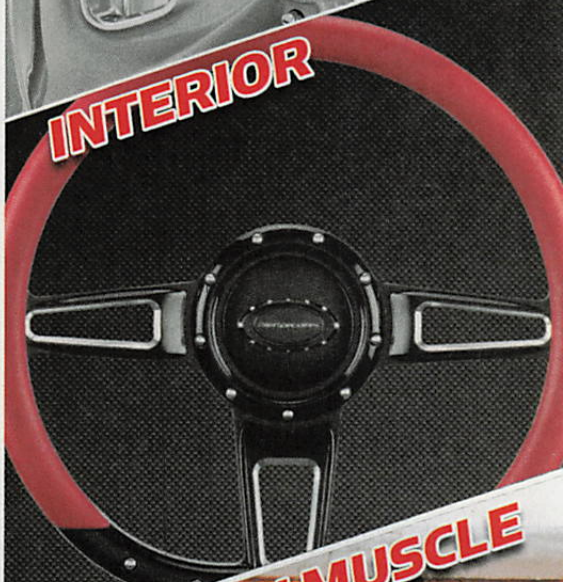
BilletSpecialties
THE BEST IN BILLET
ENGINE



WHEELS



INTERIOR



MODERN MUSCLE



STREET & STRIP

See it all
WWW.BILLET SPECIALTIES.COM
866-317-5935
SCAN THE QR CODE
WITH YOUR PHONE
GET THE CATALOG!



HOT ROD

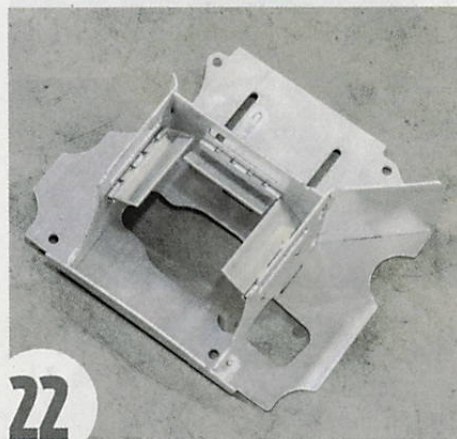
DIGITAL EDITION



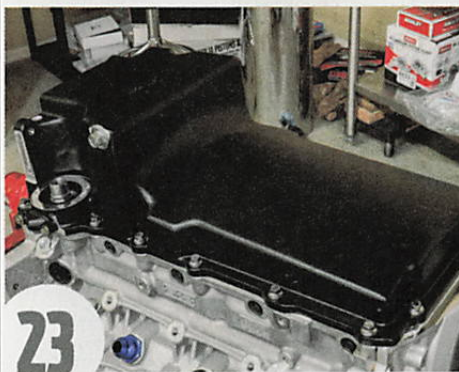
WRENCHIN' @ RANDOM



21



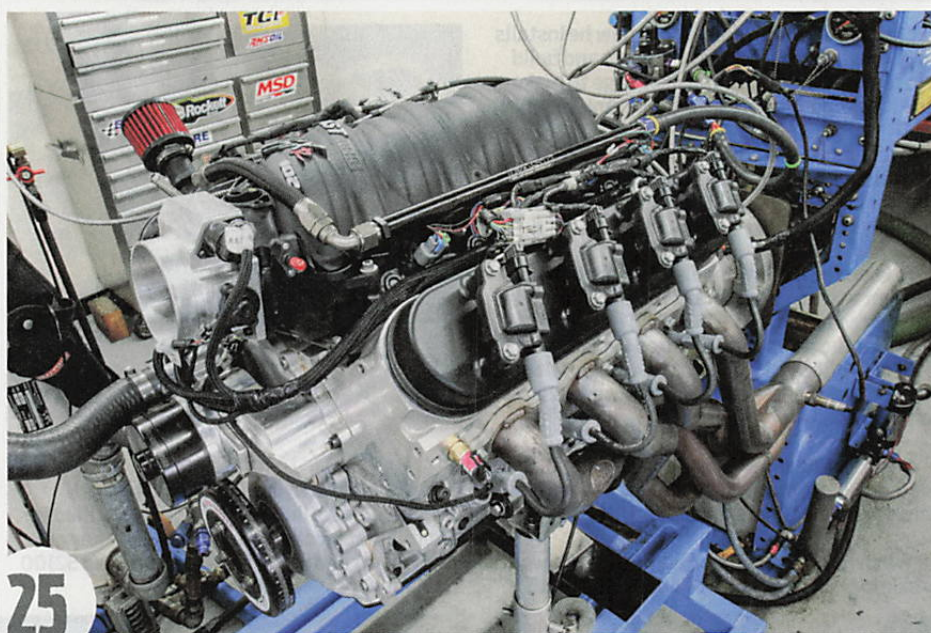
22



23



24



25

21 Ed Doyle at CHE built us a set of their bushed LS3 rocker arms. CHE takes the GM rocker arms, ditches the problem-prone needle bearings, and replaces them with bushings. According to Ed, "This has the added benefit of creating a stronger unit, with better load characteristics, and a rocker with a greater service life even under extreme conditions." Having an LS rocker arm fail and blow debris through an engine sucks, so we're more than happy to make this upgrade.

22 Our Camaro has a Chassisworks frame, so we opted for a Holley oil pan. To it, we added this Improved Racing trap-door pan baffle offered through Holley specifically for their pans (PN 302-10).

23 After securing the baffle in the oil pan (PN 302-1), we bolted it to the bottom of the RHS

block using a Fel-Pro gasket and some of the stainless hardware from our ARP accessory bolt kit (PN 534-9605).

24 Nearing completion, we installed a pair of tall Holley LS valve covers (PN 241-121) along with a FAST 102mm LS3 intake, matching fuel rails (PN 146028B-KIT), eight FAST 50-pound fuel injectors (PN 30507-8), and the rest of our ATI damper.

25 For the dyno session at Westech Performance Group, we slapped on the MSD coils, matching plug wires, and bolted up a set of Hooker long-tube headers. Our car will be running a throttle-by-wire unit, so we borrowed a FAST throttle body. After bolting on a Meziere electric water pump we were ready to fire up the 440 and run it through the break-in procedure using Lucas oil.

» SEARCHABLE CONTENT

» INSTANT DELIVERY

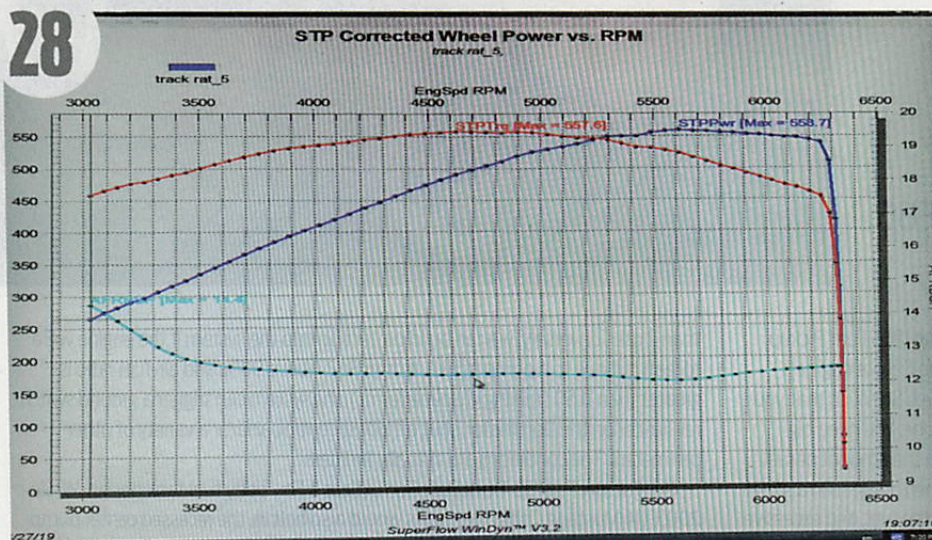
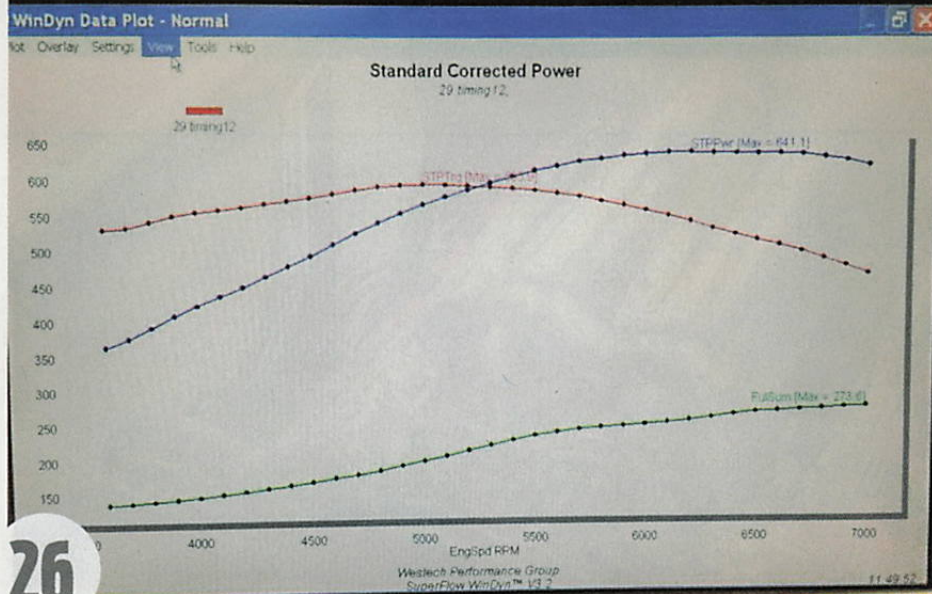
» MOBILE LIBRARY

» VIEW ON ANY DEVICE

ORDER ONLINE:

digital.hotrod-online.com





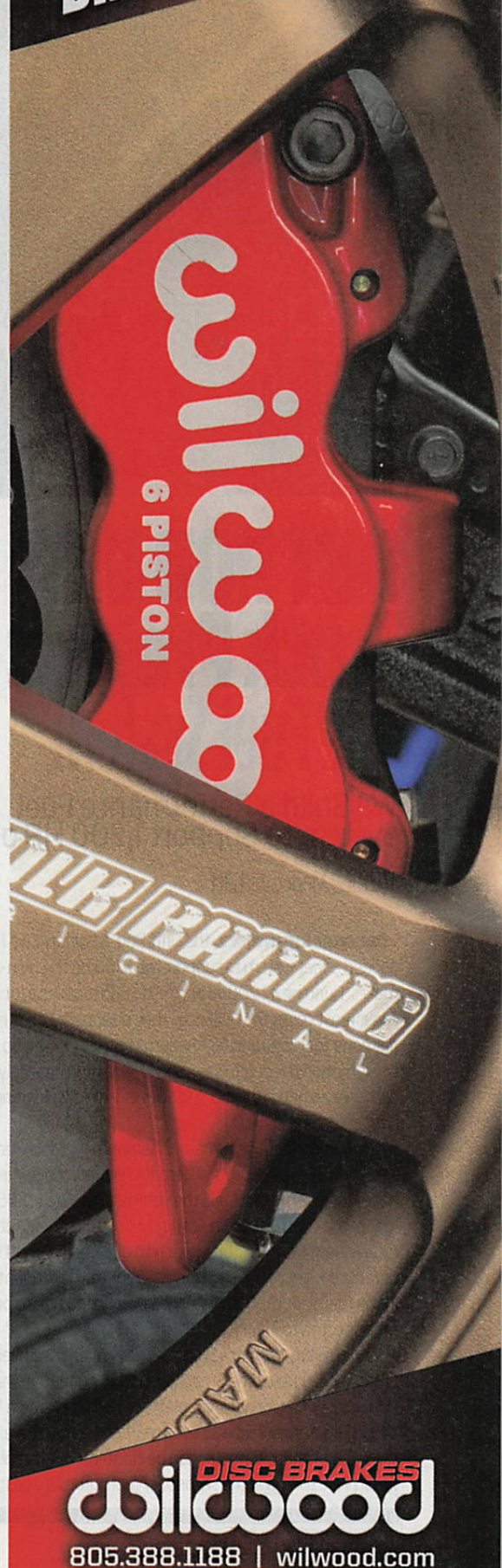
26 After some tuning on the Holley HP ECU, we knocked down our best pull of 641 hp at 6,200 rpm and 596 lb-ft at 5,000 rpm. But this is about more than peak numbers. Notice that even though peak hp was at 6,200 rpm, the curve stayed nearly flat all the way to 7,000 rpm. Also notice that when we rolled into the pull at 3,600 rpm, the 440 was already making around 540 lb-ft of torque. We call that a recipe for a good time.

27 Of course, we often get asked, "Yeah, but how does it do in the car?" Well, in this case, we could find out since it was installed into our Track Rat 1968 Camaro project. With the engine installed, breathing through Holley/Hooker headers, along with a full exhaust, we strapped

the Camaro to Westech Performance's chassis dyno for some tuning.

28 Many things can change the "at the wheel" power numbers of an engine that was run on an engine dyno. Drivetrain loss, rearend choice, and the size/design of the exhaust are all factors. At the rear wheels, this combination was good for 558 lb-ft and 559 hp. Peak power was much sooner on the chassis dyno, but it held steady through 6,200 rpm. However, it was the torque that got us all giddy: 450 lb-ft way down at 3,000 rpm with a flat curve past 5,200 rpm—we will need to reevaluate our rear tire budget. When it comes to making torque, there really is no replacement for displacement on a naturally aspirated engine.

COMPLETE
PERFORMANCE
BRAKE SYSTEMS



DISC BRAKES
wilwood

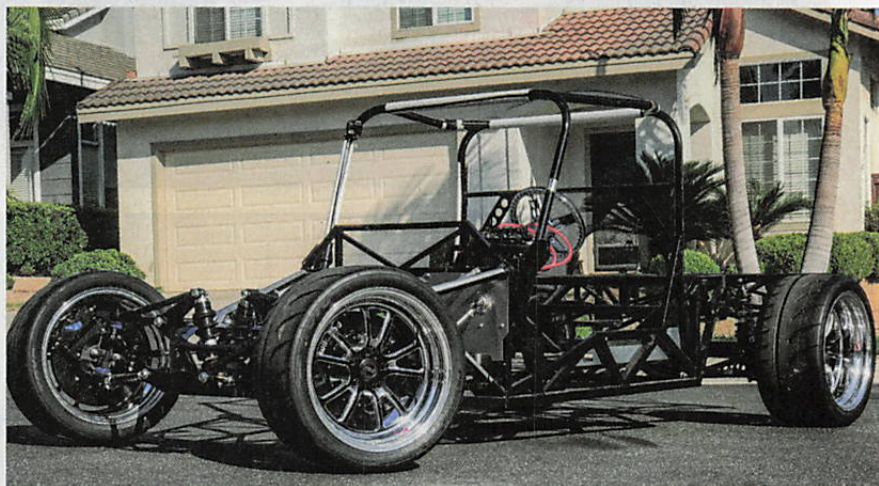
805.388.1188 | wilwood.com



HOT ROD Drift Truck Project: The Fuel System

We Build a Performance Fuel System to Support 1,200 HP on E85

✍️📷 Mark Gearhart



Our ongoing project, the Drift Rod, a Factory Five Racing 1935 Ford Pickup needed a fuel system to support the 1,200 hp the twin-turbo Coyote engine makes. Running a 1,200hp engine on E85 requires a lot of fuel. So much that you can almost count the dollars as they disappear into the engine. You need big diameter fuel lines and high-volume pumps to keep up with the amount of fuel consumption needed to keep this engine running safely. When doing so in a street car, you also need to factor in issues of excessive heating of the fuel, and excessive heat in the pump.

For this project, we turned to Aeromotive, which recently introduced its Trifekta triple fuel-pump system for big horsepower and/or alcohol-burning applications. Trifekta fuels the vehicle off a single, E85 friendly 450lph Walbro fuel pump for cruising. The other twin auxiliary 450lph fuel pumps are triggered by anything from a Hobbs switch to a Racepak SmartWire. The concept here is to reduce fuel cycling and likewise, reduce the amount of heat that can build up in the fuel system. Then when it's time for all hell to break loose, the second two pumps come to life.

Our auxiliary Walbro 450lph pumps will be controlled through a Racepak SmartWire system. The SmartWire is pretty smart in that it can input all our Holley Dominator's sensor data, coupled with Racepak's own V-NET sensors, to provide all available engine data to the SmartWire. From there, conditional formatting, like "greater than" formulas can be created. For example, we can program the SmartWire to trigger the secondary fuel pumps if boost pressure is greater

than 2 psi. Conversely, we can build protection into the system if the engine were to lean out due to a pump failure. If throttle is above 90% and air-fuel ratio is greater than 11.5:1 (talking gasoline terms), the system can trigger a ground switch rev limiter on the Dominator, shut off boost control, and/or a variety of other perimeters. The conditions are virtually limitless.

Our Factory Five '35 Truck Drift Rod utilizes a Fox-body fuel tank design. While 2003-04 Mustang Cobra fuel tanks would also bolt in, the recessed center pump design simply wasn't deep enough to accommodate the Trifekta. Our only solution was to mount the pump module in the back corner of the tank where there was enough depth. No worries though as Aeromotive designed a pretty trick baffling system around the Trifekta. The outer foam baffle provides the first layer of protection and optional check valves (PN 18022) can be installed to further prevent fuel sloshing away from the pickups.

The installation of the Trifekta is very similar to Aeromotive's other Stealth systems: cut a hole in the tank, put mounting studs in place, then set the pump's height. The Trifekta requires a 6- to 11-inch mounting depth. With everything in place, the Trifekta can support up to 1,650 EFI-backed flywheel-horsepower on E85!

Sources

Aeromotive; 913.647.7300;
aeromotiveinc.com

Factory Five Racing;
508.291.3443; factoryfive.com

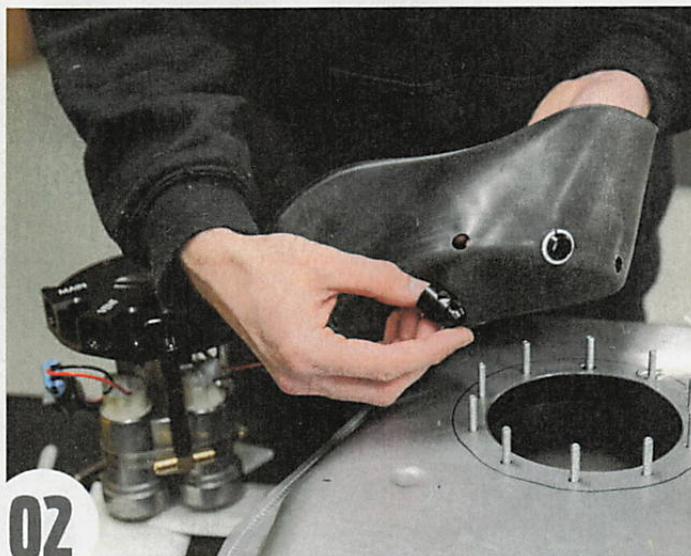
Glenn's Performance;
928.415.0651;
glennsperformance.com

Radium Engineering;
971.990.1141; radiumauto.com

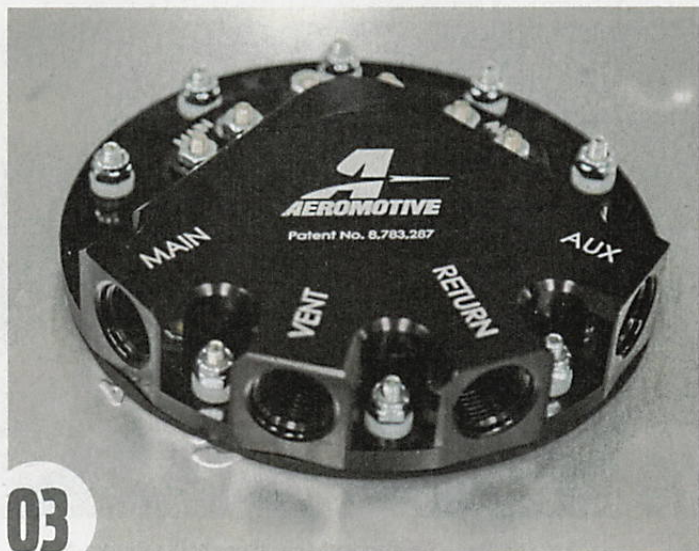
Russell Performance;
800.416.8628; edelbrock.com



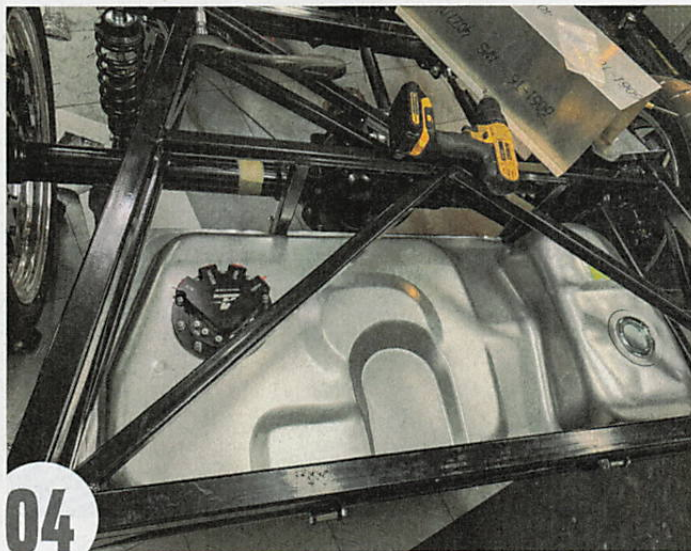
01



02



03



04



05

01 To begin, we install the mounting studs into the tank. A 6- to 11-inch depth is required for the Trifekta triple pump system.

02 The optional check valves (PN 18022) can be installed into the Trifekta's bladder to help maintain fuel around the fuel-pump pickups during cornering.

03 There are four -8AN ORB ports: one for the primary pump feed, a single AUX port for the second and third pumps, a return line, and a vent. One set of power and ground ports provide primary power to the main port, another for the second two, and a third set of ports for the fuel-level sending unit.

04 There's plenty of clearance to our Factory Five Truck's frame as the Trifekta sits lower than the factory fuel pump installation location, which has been capped.

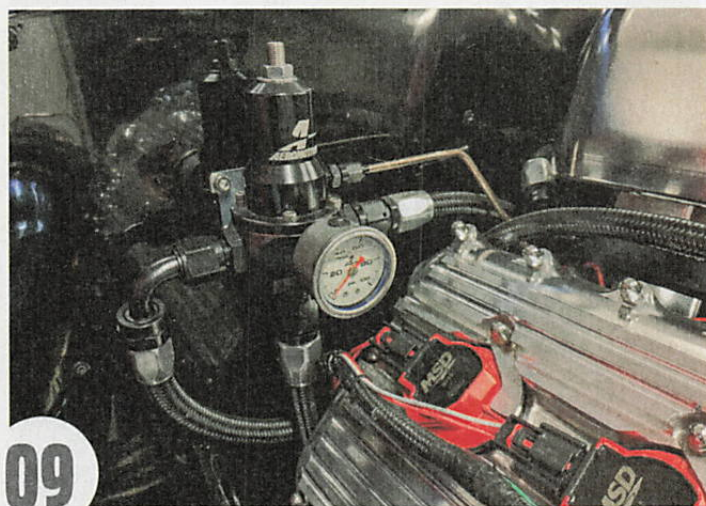
05 Glenn's Performance manufactures this slick, gloss black fuel-tank cover that is retained by stainless steel straps. The '35 Truck is designed to use Fox-body Mustang components.



06 07



08



09

10

06 Although the pumps house the pre-filters, an inline 10-micron (PN 12339) post-filter ensures our E85 will be as clean as possible before heading to the injectors. Twin -12AN ORB ports are adapted down to -10AN with our Russell fittings.

07 We're a big fan of Radium Engineering's Coyote fuel rails and have used them on multiple projects. These high-flow rails have provisions for their Fuel Pulse Dampers and auxiliary 1/8 NPT ports. Due to the clearance issues with our billet InnoV8 intake manifold, we weren't able to use their on-rail dampers.

08 When flowing this much fuel, dual feed and return lines are the best option. This means a single -10AN feed line connects to a Y-block that splits into two -8AN rail feeds on the front. The fuel return line is similarly routed. We used Russell ProClassic II line and fittings throughout the system.

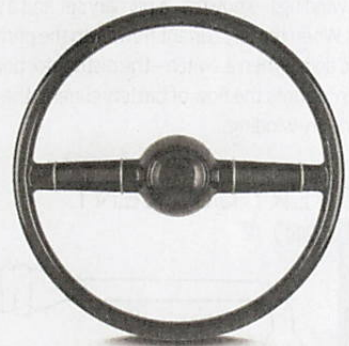
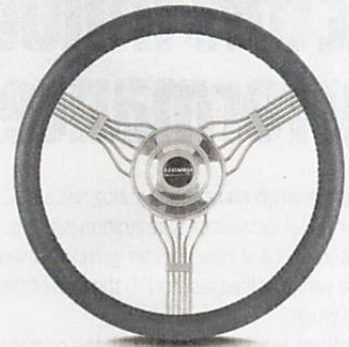
09 Aeromotive's two-port fuel pressure regulator (PN 13134) is mounted on the fire-wall next to the engine along with a liquid-filled pressure gauge (PN 15633). We ran a nickel-copper hardline to the intake manifold to provide 1:1 boost reference signal to the regulator. This line also contains a gauge port adaptor for our MAP sensor.

10 Our build is almost done. Stay tuned for articles on the turbo system plumbing and the retina-searing blue paint job.



LECARRA[®]

Steering Wheels



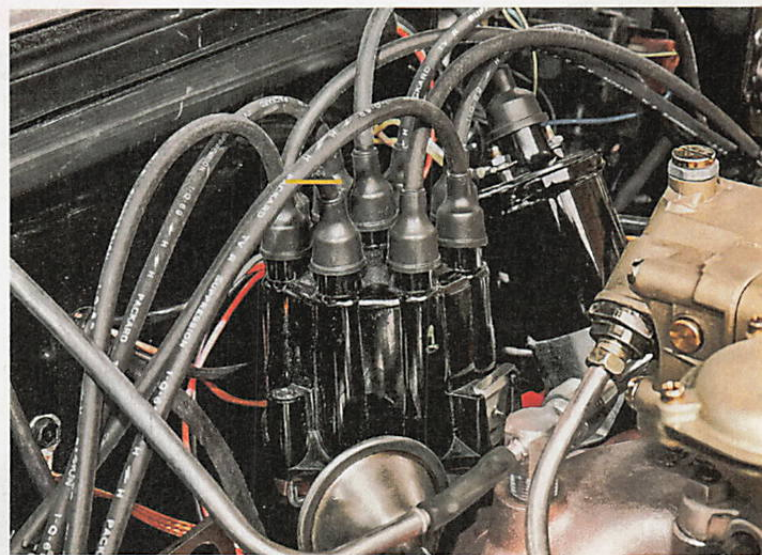
LOKAR.COM • 877.469.7440



How Does an Ignition Coil Work and What Factors Influence Its Performance?

►Paging through an ignition catalog reveals all sorts of different ignition coils for conventional distributor-type ignition systems. To say it's a mite confusing is an understatement! Just how does an ignition coil work to step up a battery's 12 volts (even less with a ballast resistor) to the tens of thousands of volts needed to fire the spark plugs?

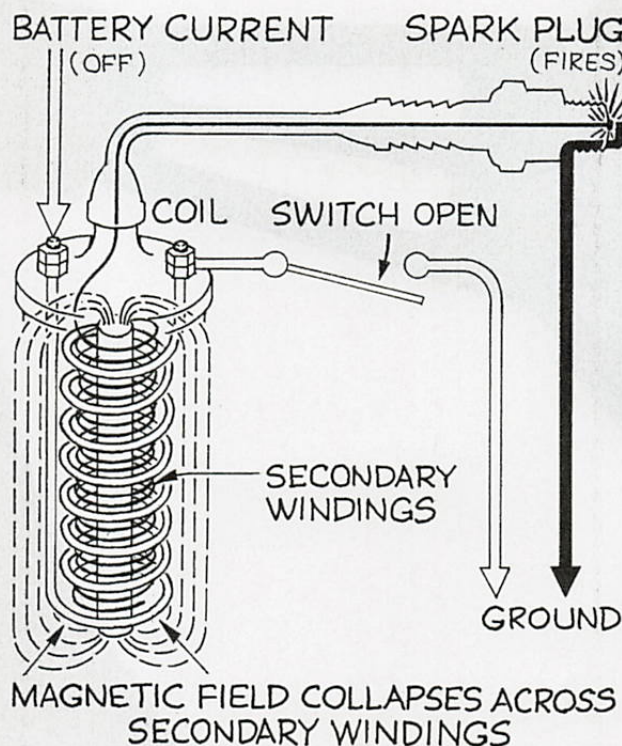
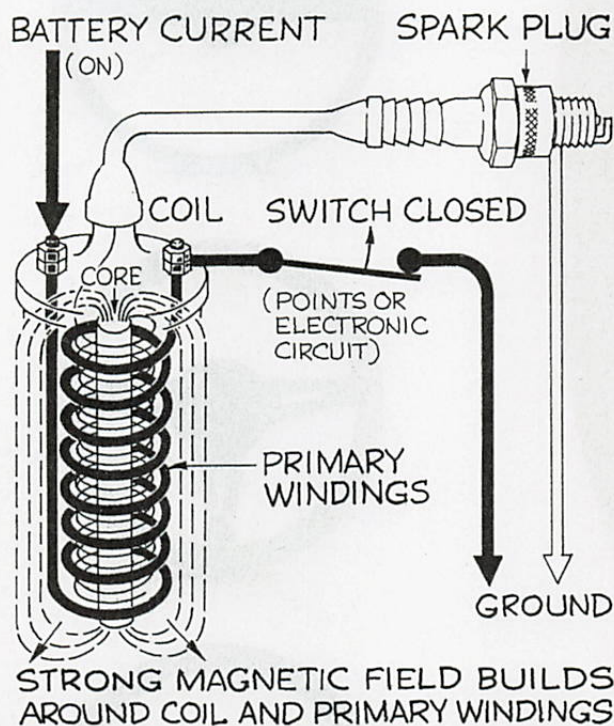
A windings road. It all starts with the concepts of inductance and electromagnetism. Inside an ignition coil, there are two sets of wire windings (aka coils). The two windings—known as a primary set and a secondary set—surround an iron core. When battery current flows into the primary windings, it produces a magnetic field. When a switch—the distributor points opening or an electronic trigger—interrupts the flow of battery current, the magnetic field collapses across the secondary windings.



■ A production GM canister coil and Delco small-cap distributor in a 1969 427 COPO Camaro. Ignition coil output and appearance have evolved in the last half century, but coils still operate under the principles of electromagnetism and inductance to step up low-voltage battery current to tens of thousands of volts.

Source

MSD, a Holley brand;
El Paso, TX; 888.258.3835;
holley.com/brands/msd



■ Above: With the switching circuit (points or electronic trigger) closed, current flows from the battery and into the coil's primary windings. Above right: Opening the switching circuit stops the current flow, causing the magnetic field to collapse across the coil's secondary windings. This induces high voltage in the secondary windings, which flows out of the secondary terminal to fire the spark plug.

Magnetic attraction. The very act of the points opening or an electronic signal breaking the circuit (interrupting the magnetic field) causes a momentary voltage spike. As the magnetic field continues collapsing, the electromagnetic phenomenon of inductance causes another current to flow in the secondary windings. Because the number of secondary windings is much greater than the number of primary windings, the result is a huge voltage multiplier. So: break circuit, initial voltage spike, magnetic field collapses, inductance results in the creation of greatly increased current in the secondary windings.

Turns for the better. The relationship between the coil's primary and secondary windings responsible for voltage step-up is termed the "turns ratio." The greater the

turns ratio, the greater the voltage step-up. A 100:1 turns ratio (typical of many coils) means there are 100 secondary turn windings to every one primary turn. With a 100:1 turns ratio and, for example, an initial 250-volt current-interruption spike, in theory there would be a spark output of 25,000 volts (assuming no losses to resistance). Adjusting the turns ratio changes the amount of output, but more is not always better. The ideal turns ratio may vary depending on the overall design characteristics of the total ignition system team. At some point a higher turns ratio becomes counter-productive. Too high a ratio causes secondary voltage to start decreasing. Also note that as voltage output increases, current output decreases. Increasingly higher turns ratios affect other electronic properties such as resistance, reactance, and impedance.

Precision HOTRODS & FABRICATION *Macedonia, Ohio*



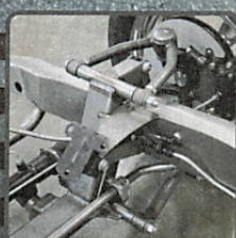
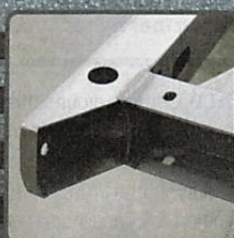
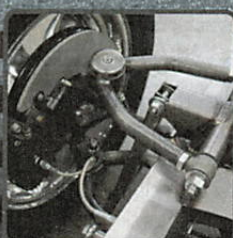
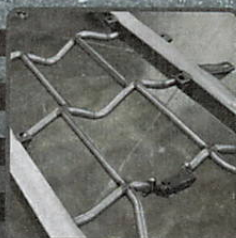
**STREET
RODDER**

BUILDER OF THE 2020 LOKAR
STREET RODDER ROAD TOUR 1934 FORD

SPECIALIZING IN CUSTOM CHASSIS

CHASSIS • BODY & PAINT • CUSTOM EXHAUST • MAINTENANCE • TURN-KEY

1928-48 FORD • 1955-57 CHEVY • 1953-62 CORVETTE • COMPLETE ROLLERS



precisionhotrodsandfab.com • 330-908-0234

■ **MSD has a whole series of Blaster 2 and 3 canister-type ignition coils that can replace stock coils used in various OE ignition systems. They're also a good complement for MSD 6-series ignitions. With a 100:1 turns ratio and relatively low resistance, output is about 45,000 volts. Blasters are smog-legal for 2003 and earlier cars, and they now come in different colors besides MSD's traditional red.**

Resistance is futile. Coils with even the same turns ratio can still have varying amounts of resistance. Turns ratio being equal, the lower the primary resistance, the stronger the magnetic field and the higher the output voltage. However, if resistance is too low, the higher current could damage the distributor's points or electronic trigger.

Time waits for no mortal... or ignition coil. Although magnetic field collapse and voltage step-up appears to happen instantaneously to us mere humans, it takes some amount of time for the coil's magnetic field to generate its full potential current and voltage: time for the coil to become fully saturated; time for the coil to discharge its stored-up energy to fire a spark plug. Engineers refer to a coil's time-charge factor as "dwell," which is expressed in crankshaft degrees. The duration of dwell can vary depending on the ignition system—30 degrees with most traditional points systems, but various electronic triggers can have (depending on the design) less dwell, more dwell, or even variable dwell.

Dwell isn't swell. At low rpm, 30 degrees of coil dwell time can be two or three times longer than needed, resulting in excess ignition system heat buildup and unnecessary alternator power consumption. This shortens component life. But at high rpm, 30 degrees isn't enough: The faster the crank spins (the higher the engine rpm), the less time available for recharging the coil. At some engine rpm point, the coil can't fully recharge before it becomes time to fire the next spark plug in the engine's firing order. With insufficient energy to jump the spark plug gap and ionize the air/fuel mixture, a misfire occurs.



MSD

coil, and the best of these systems can fully charge up to as high as 15,000 engine rpm. Invariably, a coil intended for use with a CD system has a different turns rate, internal resistance, and rise time compared to a coil used on a traditional inductive system. (For a discussion of capacitive discharge vs. traditional pure inductive ignition systems, see: "Inductive vs. Capacitive Discharge Ignition Systems" on HOTROD.com)

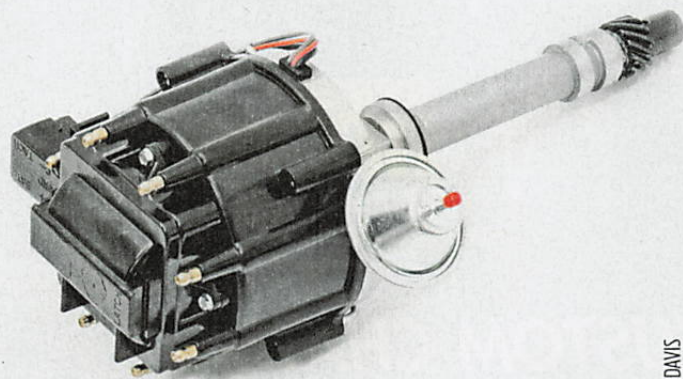
Best Bros: There is also an often-overlooked change in coil behavior when used with a CD system. When teamed with a capacitor, the coil becomes a tuning device for the ignition system. By swapping in different coils with different levels of inductance, it's possible to improve power and on-track performance (see "Coil Tuning" on HOTROD.com for a detailed explanation on how to do this).

A "hot" coil runs...hotter: As coil output increases, so does its need to radiate heat. More heat creates more resistance. To help cool them down, traditional canister-shaped coils are oil-filled. If oil starts leaking, it's a sign that the coil's days are numbered. Modern, irregularly shaped performance and racing coils typically reject heat with epoxy potting. And the iron core is no longer a round tube in the new designs. For instance, MSD's E-core and U-core coils have proven to be more efficient than traditional canister configurations for radiating heat while stepping up the voltage between windings, due to their smaller and more enclosed area where the field collapses. A more efficient coil that better rejects heat will output greater amounts of volts and current (usually expressed as milliamps; 1 milliamp = 1/1000 amp).



MSD

■ **MSD high-tech coils:** The compact E-core Blaster SS is an affordable high-output unit for inductive and CD ignitions. Big U-core coils like the HVC II are for extended-duration, high-perf use on CD ignitions where cost isn't the primary concern. The iron core's laminations have many more thin metal layers to yield a higher-frequency coil with less energy loss.



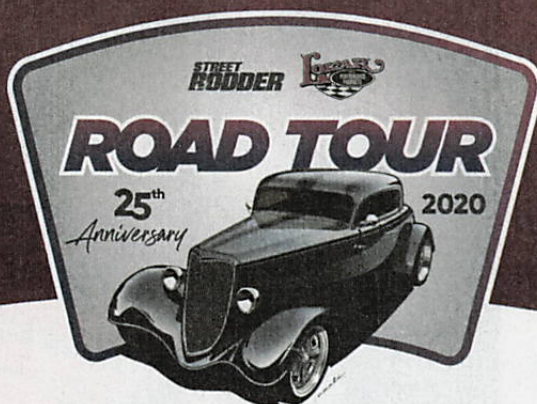
MARLAN DAVIS

■ **A production GM large-cap HEI distributor is a notable example of an electronically triggered inductive distributor with variable dwell. The OE GM/Delco module has a dwell predictor circuit that shortens lower-rpm dwell time to 15 degrees and lengthens it to as high as 40 degrees at high rpm.**

Charging ahead with CD. One way around this is a capacitive discharge (CD) ignition system. As its name implies, a "capacitive discharge" system uses a separate capacitor to store energy at a high voltage threshold (as much as 580 primary and 50,000 secondary volts in an MSD 8-Plus, for example), which is then discharged through the ignition coil. Capacitors charge far more quickly than a

It takes an (ignition) village. In sum, to achieve maximum performance, the coil should be optimized for the type of ignition system employed (inductive or capacitive discharge) and distributor's switching mechanism (points or electronic), expected engine operating rpm range, and duty cycle (street, short-duration racing, or endurance racing). A coil with the correct turns ratio to work right with one type of ignition system may not be the best solution for a different type of system. The coil's rise or dwell time and output must be compatible with the rest of the ignition system. Some extremely high-output coils may only be used in short-duration drag racing, compared with others optimized for long-duration oval track or an extended lifetime of street performance. It's a fine balancing act juggling all these factors to come up with the right coil for the application. But that's why they are so many choices out there! For a critical performance application, it pays to consult your ignition system manufacturer to come up with a team that works harmoniously together. ■ **Marlan Davis**

STREET RODDER



OFFICIAL
BUILDER



EVENT SPONSORS

Shades of the Past



After 500,000 miles and almost as many smiles, we begin our 25th summer traveling the highways of America. Make your plans and mark your calendar. This is definitely the year to do a road tour!

Shades of the Past

SEPT. 4 - 12
Shades of the Past Tour
Nashville, TN
to Pigeon Forge, TN

2020 ROAD TOUR SCHEDULE



OCT. 18 - 24
Vintage Air Tour to Run to the Sun
San Antonio, TX
to Lake Havasu, AZ

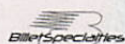


OCT. 18 - 25
Sherm's Plating Road Tour
Sacramento, CA
to Portland, OR



OCT. 4 - 11
Cruisin' the Coast Road Tour
Biloxi, MS

PRODUCT SPONSORS



REGISTER TODAY!

STREETRODDER.COM



Gerry Benson Asks ... Why is My Chevy Distributor Rotor Way Past the No. 1 Cap Terminal at TDC?

✍ Marlan Davis 📷 Rollings Automotive

Q:

I recently acquired a 1968 Chevy truck with what is probably a replacement 350 engine. It sat a long time and was in unknown condition. I thought it might run if it could get fuel and spark. I made sure it turned over freely, then discovered no spark. I replaced the coil, then the distributor points, condenser, rotor, and cap. I've got good spark now at the points and 12 volts to the coil and points area.

At the start of the project, I put it on TDC [top dead center], turned it over, and at the No. 1 hole, it gave a "whoosh" to my finger. I then lined up the zero mark on the balancer with the timing pointer—but the rotor points between No. 1 and the next terminal, No. 8, on the cap.

The mark may be wrong, so I was going to try to establish absolute TDC with some tool, but I don't have a piston plunger or TDC stop tool. I thought about using a hex wrench with marks on it or just have someone hand-crank the motor while I see if the tool comes up or goes down. What do you think?

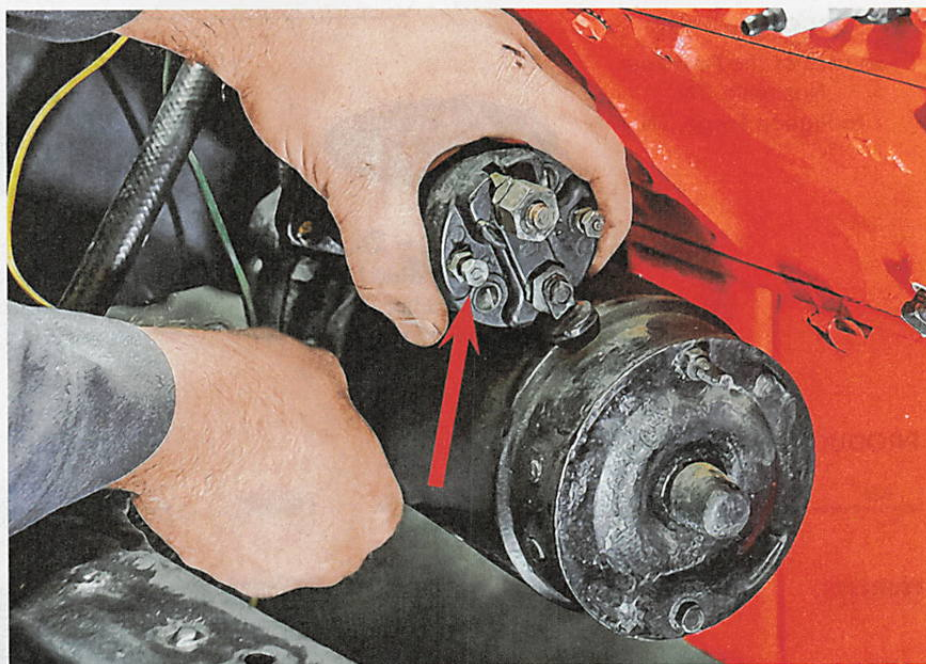
A:

The source of a "cranks, but no start" problem on your Chevy 350 distributor install is most likely incorrect distributor alignment with the harmonic balancer or a mismatched balancer and timing tab. But, for the benefit of our readers, with the help of the experts at Rollings Automotive, let's start simple and work our way up the complexity tree.

Engine getting fuel? Glaringly obvious, but since you didn't specifically mention it, is the carburetor receiving fuel? Is there fresh fuel in the gas tank? Is the mechanical fuel pump pumping? Is any fuel filter clogged? If fuel is reaching the carburetor, what about the carb's float settings, choke settings, and idle-mixture adjustment? Norm Rollings says a crude first check for all of this is to squirt about 8 ounces of diesel starting fluid into the top of the carburetor. Crank the engine while holding the throttle down halfway (which opens the choke and lets more air in). If the engine fires for a moment and then dies, you'll need to take a closer look at the fuel-supply system and carburetor settings.



Rollings Automotive intern Kenny Scheer rotates a small-block Chevy's harmonic balancer to the shop's recommended first fire-up position. To aid starting on a newly installed engine, it's better to over-advance the initial timing.



Still running a points distributor? Be sure your GM starter solenoid has an "R" bypass terminal (arrow) that supplies a full 12 volts to the coil only under cranking. In an old stock harness the yellow wire hooks up to this terminal.

Proper voltage under crank and run conditions? You say, "I'm getting 12 volts to the coil and points area." If that's just a static voltage check, then it's not definitive. You need to check voltage under cranking conditions. To avoid burning out the ignition

points on an old Chevy system, there must be full battery voltage (12 volts) under crank, but about 9.5 volts under "run". The way Chevy temporarily supplies full voltage to the coil on an old points system is via an extra "bypass" (usually yellow) wire that runs from the

Tommy Lee Byrd

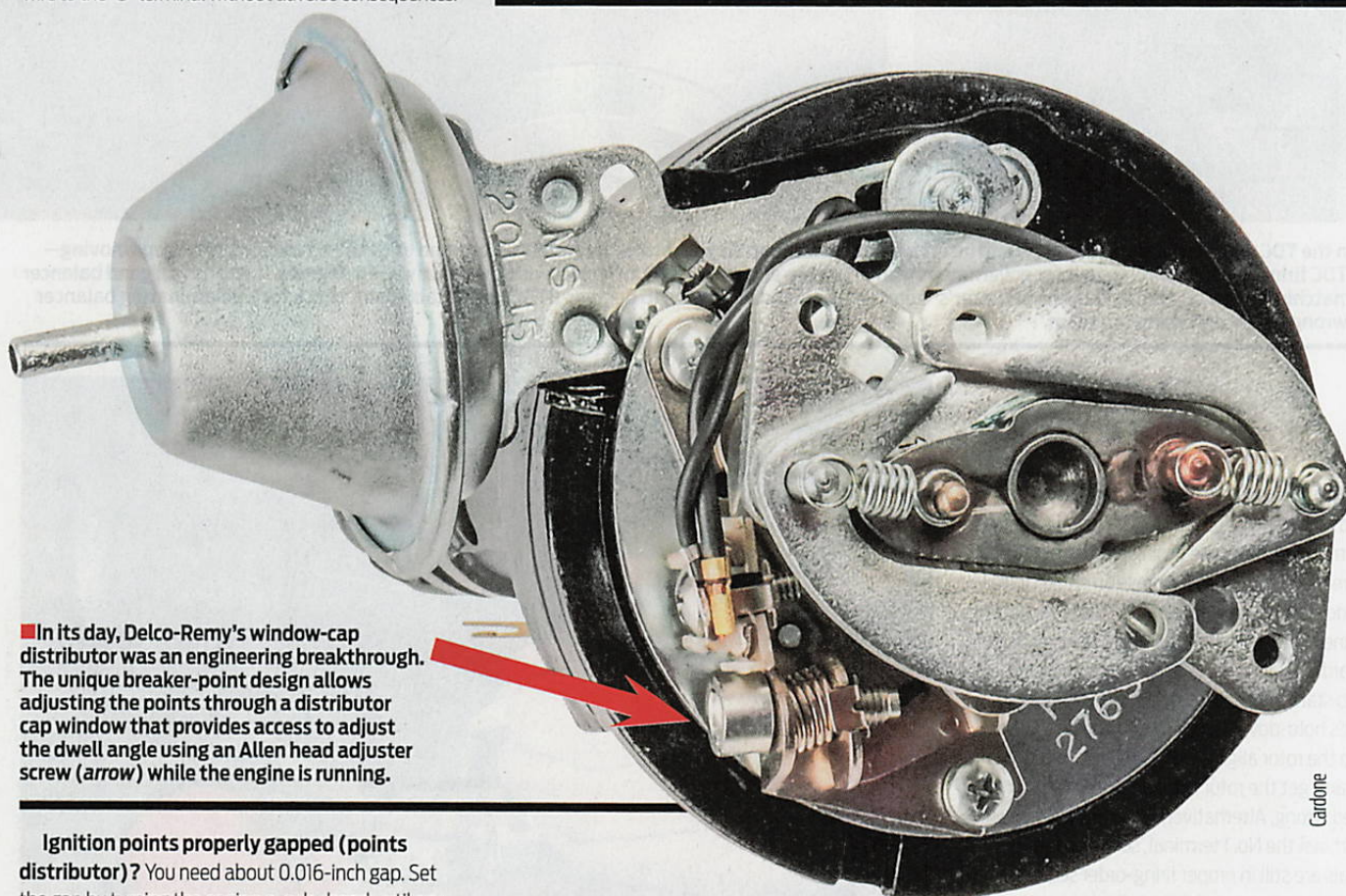
ASK MARLAN A TECH QUESTION: PITSTOP@HotRod.com

Please provide a daytime phone number so we can contact you for more information if necessary. Questions will be answered in the print edition or on HotRod.com.

R-terminal on the starter solenoid to coil positive (+); it's "hot" only under crank conditions. The bypass is in addition to the standard ignition switch to coil (+) wire that, after the engine fires, exclusively supplies power under normal "run" conditions, but at lower than 12 volts because there is (or should be) a voltage-reducing ballast-resistor or resistor wire in that circuit. When the "R" terminal wire isn't connected, there may not be enough voltage under crank to fire the engine. If the starter came with the current engine, be aware that starters from the mid-1970s on up might not have an "R" terminal since a bypass isn't needed with HEI big-cap breakerless distributors or computer distributors that require a full 12 volts under all conditions; they use a nonresistor 12-gauge pink wire all the way from the ignition switch to coil [+]. Don't hook the old "R" bypass wire directly to the solenoid "S" terminal (which is also normally hot only during crank), because under run, about 9.5 volts will backflow from coil (+) to the "S" terminal, causing the starter to engage while the engine is running. Ideally, use an older or universal-type starter that has an "R" terminal or equivalent bypass circuit. If you must use a starter without an "R" terminal, replacing the stock bypass wire with a Powermaster diode wiring harness (PN 600) will let you hook the cranking wire to the "S" terminal without adverse consequences.



■ **Whistles while you work:** An inexpensive TDC whistle or even 3 feet of flexible $\frac{3}{8}$ -inch rubber fuel-line hose pushed into the No. 1 cylinder's spark plug hole will get you close to TDC. Three feet of hose allows you to hand-crank the engine by the balancer bolt while holding the other end of the hose up to your ear. Mr. Gasket sells its version of a flexible TDC whistle under PN 8016MRG.



■ In its day, Delco-Remy's window-cap distributor was an engineering breakthrough. The unique breaker-point design allows adjusting the points through a distributor cap window that provides access to adjust the dwell angle using an Allen head adjuster screw (arrow) while the engine is running.

Ignition points properly gapped (points distributor)? You need about 0.016-inch gap. Set the gap by turning the engine over by hand until one of the distributor shaft cam's eight lobes has fully opened. If you can get the engine started, fine-tune your initial points setting by turning the miniature Allen screw inside the cap's metal window to 30 degrees as read on a dwell meter. (Note: Changing the dwell under running conditions also changes the base timing, so set the proper dwell/points gap first.)

Sources

AutoZone; Memphis, TN; 866.853.6459; autozone.com or autozonepro.com

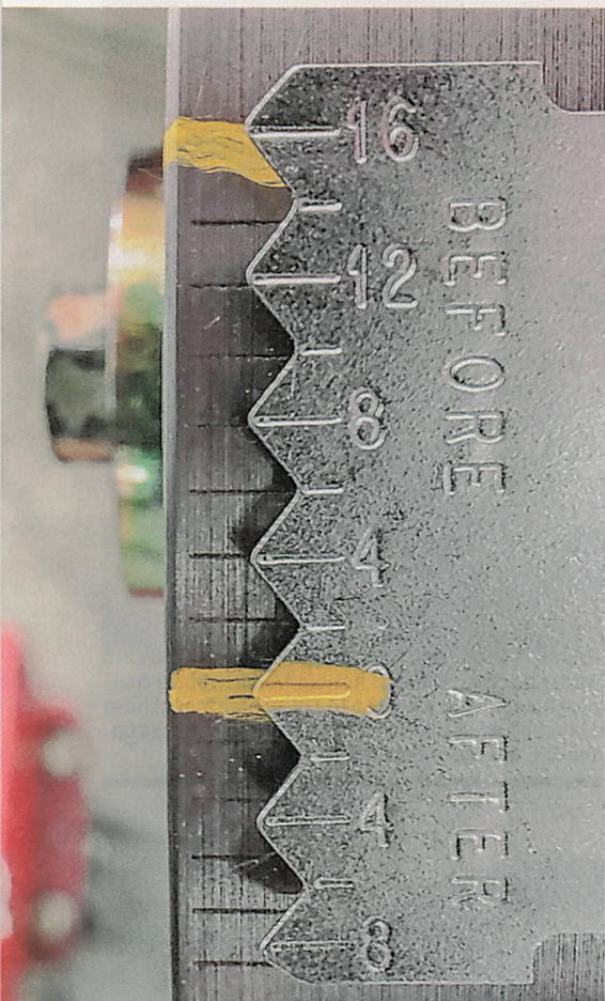
Cardone Industries USA; Philadelphia, PA; 800.777.4780 (customer service) or 888.280.8324 (tech assistance); cardone.com

Mr. Gasket, a Holley brand; Bowling Green, KY; 866.464.6553; holley.com/brands/mr_gasket/

Powermaster Motorsports; W. Chicago, IL; 630.957.4019 (sales) or 630.849.7754 (tech); powermastermotorsports.com

Rollings Automotive Inc.; Mira Loma, CA; 951.361.3001; rollingsautoinc.com

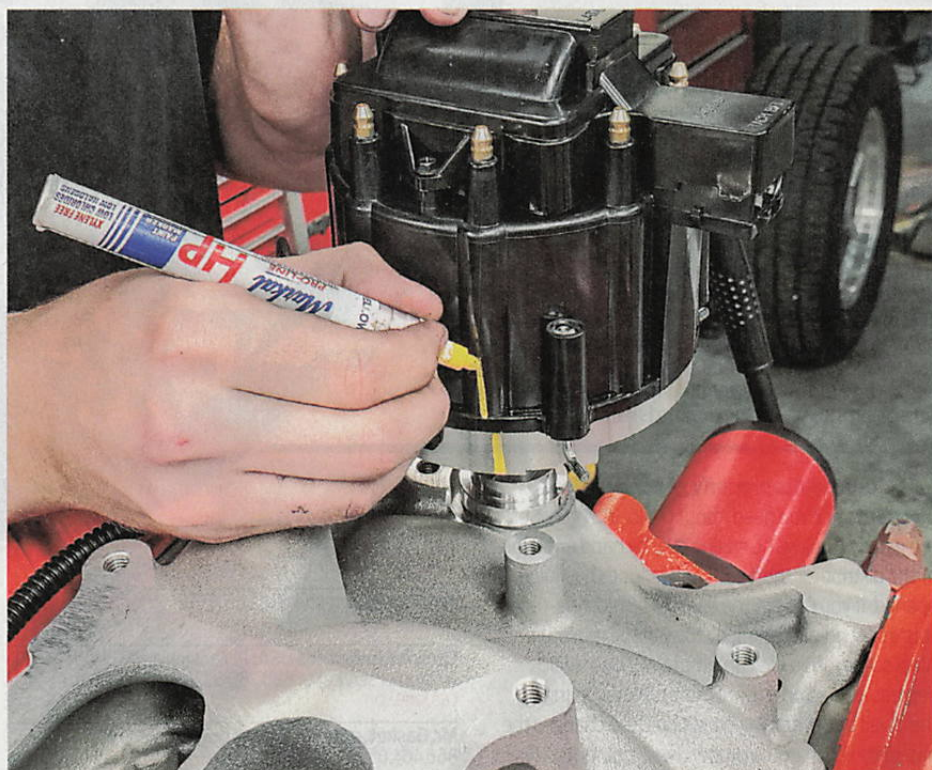
Cardone



■ When the TDC whistle goes off, remove it and insert a long screwdriver. Slowly rotate the engine up by hand until the screwdriver just stops moving—this is TDC firing, or close enough to it for government work. Turn the engine back counterclockwise the other way 16 degrees. If you have a good balancer and a matching “correct” timing tab, the balancer’s “zero” mark should align with 16 degrees BTDC on the tab. If not, check for a delaminating balancer or the wrong balancer/timing tab team.

Distributor rotor correctly oriented? The rotor tip should point to the No. 1 terminal when the harmonic damper the timing pointer is at about 16-degrees BTDC on the compression stroke. Initial timing doesn’t have to be super-accurate for getting an engine to start—but right at TDC (zero mark) is too retarded; “late timing” makes it hard (or impossible) to start the engine. Loosen the distributor bracket’s hold-down nut and twist the distributor body so the rotor aligns with the No. 1 cap terminal. If you can’t get the rotor lined up the distributor is installed wrong. Alternatively, you can make any cap terminal the No. 1 terminal, so long as the cap terminals are still in proper firing-order sequence (for a Chevy, 1-8-4-3-6-5-7-2, clockwise rotation).

■ Once the balancer is sorted, mark the distributor housing in line with the cap’s No. 1 terminal. On a Chevy big-cap HEI installation, No. 1 is usually the second wire terminal clockwise from the rectangular part of the coil cover sticking out of the housing where the external wires hook up.



Chevy / Pontiac / Ford / Buick / Mopar / Cadillac

Performance At Your Fingertips

TUBULAR TRAILING ARMS



MADE IN
USA

DRAGPACK



TUBULAR CONTROL ARMS/COILOVER



DISK BRAKE CONVERSION



ENGINE & TRANSMOUNT



BRAKE BOOSTER



BLACKOUT BRAKES



CURRIE ENTERPRISES
DIFFERENTIALS



ALUMINUM FUEL TANKS



DOUG THORLEY
HEADERS



BLACK WIDOW
MUFFLERS



ALUMINUM RADIATORS



FITTECH FUEL INJECTION



STEERING WHEELS



STEERING COLUMNS



STEERING GEARBOX



STEERING PUMP



Call Us At: 866.639.8179

Order Online at: **PerformanceOnline.com**



5% Discount

Use Promo Code:

HR5



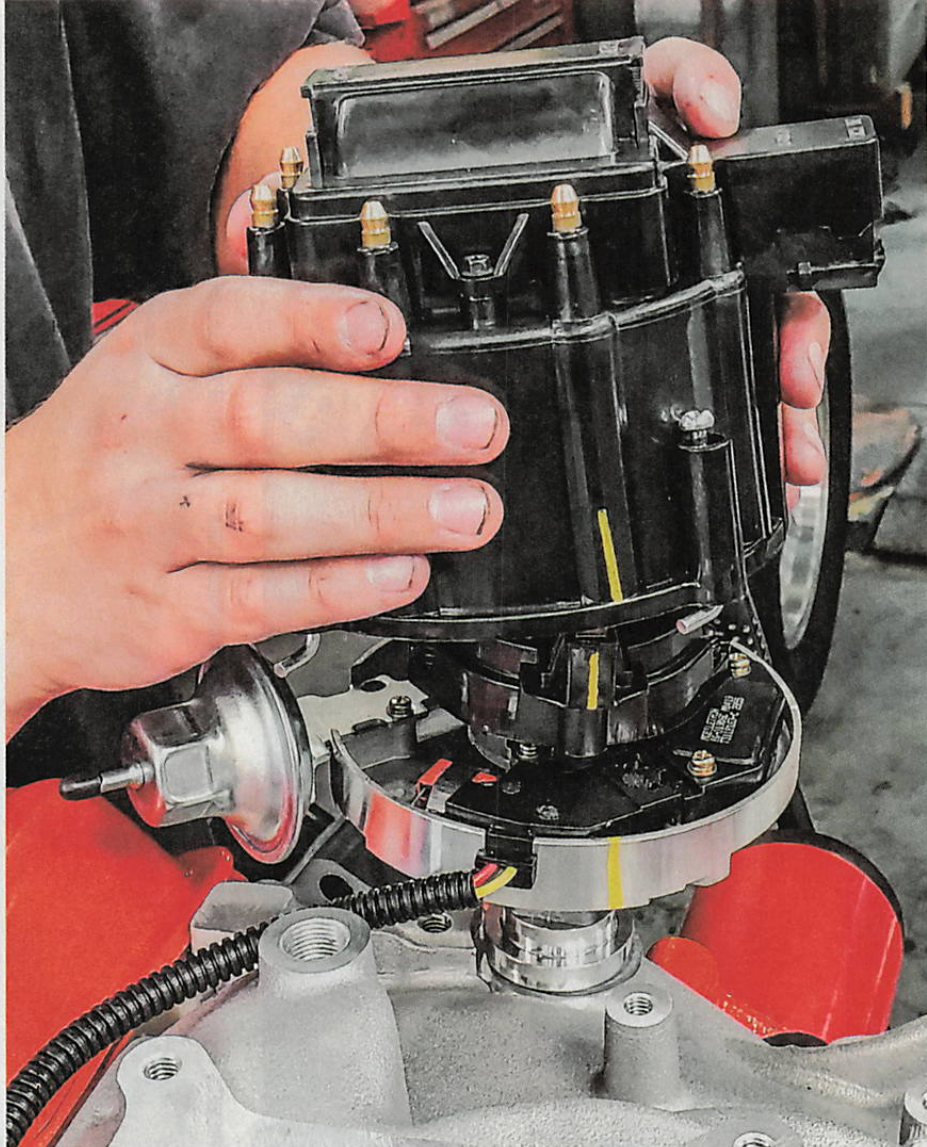
PerformanceOnline.com

1931 Sampson Ave, Corona CA 92879

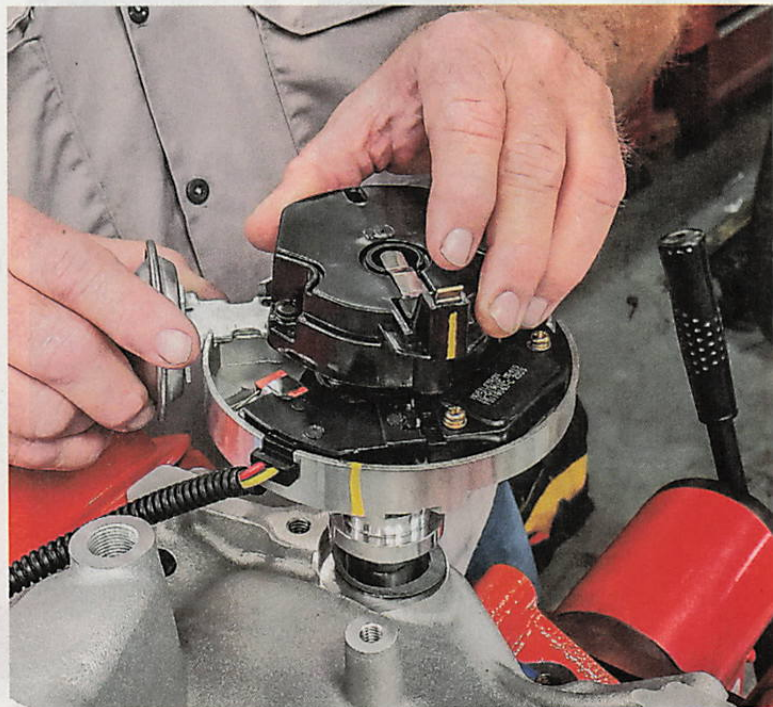
Cardone



■ On early small-cap Delco points distributors, depending on the year and model, No. 1 terminal's stock location may be on either side of the metal window. AutoZone lists a Cardone remanufactured aluminum-housing small-cap Delco that fits a 1968 C10 pickup 327 for \$44.99 (as of June 2020).



■ With the balancer zero mark and timing pointer aligned at 16-degrees BTDC, the distributor's No. 1 cap terminal, housing, and rotor should also line up.



■ Rotate the housing as needed to achieve line-up—counterclockwise for more advance; clockwise to retard. If you run out of rotation room, remove and reinstall the distributor. As the distributor shaft engages or disengages from the cam gear, the assembly self-rotates. Reinstallation needs to begin counterclockwise from the desired fully-installed position—about $1\frac{1}{16}$ inches measured around the housing's body for the small-cap Delco or $2\frac{1}{4}$ inches on this big-cap HEI. The rotor and shaft will “cam over” clockwise as it engages the gear but may still not seat fully against the intake manifold due to oil-pump driveshaft tang misalignment. Rollings says to exert downward pressure on the housing while a partner slowly hand rotates the engine clockwise until the unit drops down fully into place.

11 Champions of DragWeek 2018 all run Gear Vendors

Tom Bailey
Sick Seconds 1.0
Unlimited and
Overall 69 Camaro

Bryant Goldstone
Ultimate Iron
Javelin

Clark Rosenstengel
SS Small Block PA
Camaro 2010

Frank Sapanaro
SS Big Block PA
Nova Wagon

James McEntire
ProStreet NA
68 Camaro

Curt Johnson
SS Small Block NA
93 Mustang

Jason Tabscott
St Race Sm Blk NA
70 Camaro

Randy Heinselman
SS Big Block NA
Cuda



Chisolm/Stasiak
Gasser B Gas
55 Chev

Jarrad Scott
Gasser A Gas
62 Ranchero

Matt Bryson
Modified NA
80 Mustang



Ask these guys what
overdrive you should run
when a championship
depends on it.

OVERDRIVE
GEAR VENDORS

visit us at www.gearvendors.com call 800-999-9555 or 619-562-0060

Scott's Hotrods manufactures the MOST COMPLETE CHASSIS for ANY vehicle 1925-1987.

100% Built-To-Order with over 7.2-million different combinations of options!

800-273-5195 sales@scottshotrods.com www.ScottsHotrods.com



Spun balancer? On a factory-style balancer where the outer inertia ring is insulated from the inner ring by a rubber strip, sometimes the outer ring “walks” relative to the inner ring. One clue this is happening is if the timing keeps wandering—it won’t stay put where you set it (on a points system, the timing will change slowly over time as the points wear). If using factory balancers in a hot rod, an old-school trick is to paint a white or yellow vertical line down the side of the balancer aligned with the TDC mark on the balancer edge. Crank the engine over and see if the line down the side won’t stay properly aligned with the timing pointer. If the balancer isn’t spun and the timing marks at the balancer are off from where you think TDC is, that leaves a mismatched/wrong balancer and timing tab.

Mismatched balancer and timing tab?

Small-block Chevy balancer timing mark locations and their corresponding timing tabs have varied over the years. The timing tab and balancer must be a matched team. Some timing tabs bolt to the timing cover; some are welded to the cover. A pointer intended for use with an 8-inch-od balancer won’t have the timing marks correctly spaced for a smaller 6.73-inch-od balancer. In some cases, this may call for a different timing cover if a welded tab is needed (or not needed).

Then there are different balancer timing mark locations. The following three are the most common Chevy harmonic damper timing mark locations—but there have been other, oddball balancer locations over the years as well:

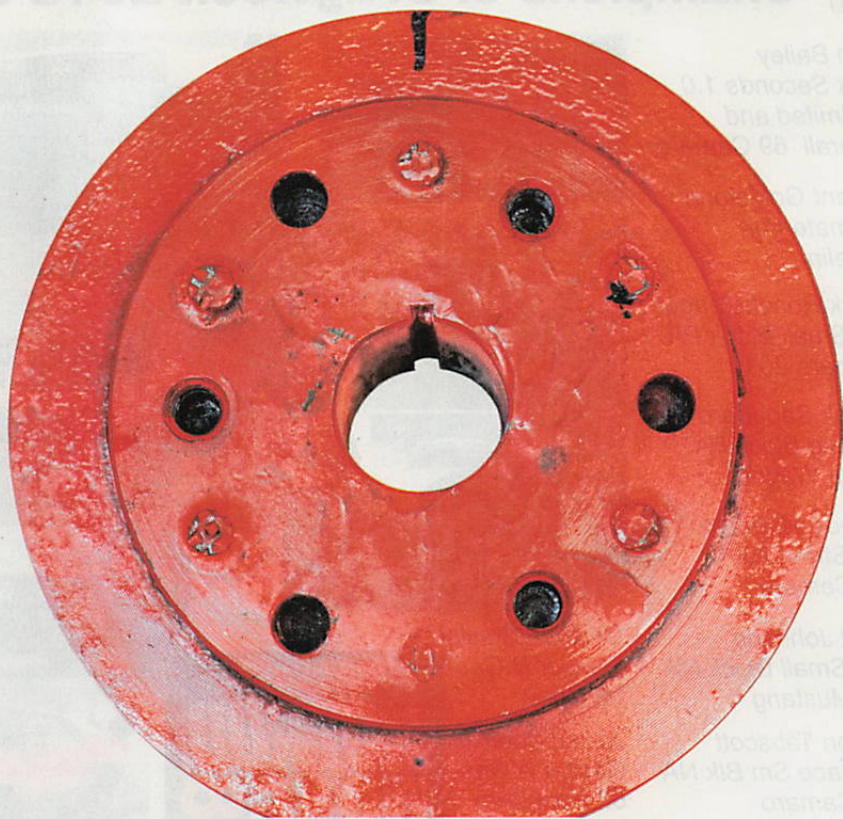
1955 to 1968: Often forgotten, on early applications (including your pickup’s original balancer) the timing mark nearly lines up with the crank keyway, about 2 degrees before the key centerline, or about 45 degrees visually off the 12 o’clock (vertical) position when No. 1 piston is at TDC, firing.

1969 to late 1970s with some continued use through 1995: The timing mark is about 10-degrees counterclockwise from the crank keyway. This puts it about 35 degrees off top-down vertical when No. 1 piston is at TDC, firing. Most performance and racing aftermarket dampers also conform to this pattern, as do most bolt-on nonadjustable timing tabs.

Some 1978-1986 carbureted engines and nearly all GM cars and trucks from 1984 through 1995: The timing mark is at the 12 o’clock position, TDC firing—about 40 degrees before the keyway. There’s usually a welded-on tab at about the 12 o’clock position on the timing cover. On a stocker, visually seeing the TDC mark requires looking straight down through the water pump area.

It might just be you have a later engine and timing tab but reinstalled the stock 1968-and-earlier balancer. At this point, you could either remark the balancer for true TDC based on your existing timing tab or buy an aftermarket adjustable timing tab and balancer degreasing tape. If you go that far, consider a spark-plug-style TDC stop to nail in true TDC once and for all. For more information, see “How Do You Accurately Find True TDC” (July ’20).

Jumped timing chain? If you have exhausted all other possibilities, remove the harmonic balancer



■ On a 1955 to 1968 small-block Chevy harmonic balancer, the timing mark is just slightly offset from the crankshaft keyway. The balancer from Benson’s original 1968 pickup would have this offset, with a corresponding timing tab.

Jeff Smith



Jeff Smith

■ This is the most common small-block balancer timing mark/keyway offset, used on virtually all Chevys from 1969 to the late 1970s, as well as some even later engines. Its timing mark is about 10-degrees counterclockwise from the keyway.

and front cover to check the timing chain. The dots on the cam sprocket and the cam sprocket must line up perfectly at No. 1 cylinder TDC, firing. If they don’t, the timing set is incorrectly installed or failing. Incorrect installation happens more often than we’d like to admit with aftermarket multikey timing sets. However, on a stocker, likely the chain or sprocket is just going away. Back in the day many original GM passenger-car cam sprockets had (believe it or not) a nylon-tooth cam sprocket.

Top Honors!

ARP Now Sponsors Two of Hot Rodding's Premiere Awards



Ron Ernsberger's 1936 Willys won the Al Slonaker Memorial Award at the 2020 Grand National Roadster Show.

Monty Belsham's 1932 Ford Muroc was named America's Most Beautiful Roadster at the 2020 GNRS.

- Used by leading car builders and race teams the world over
- Proudly manufactured in-house at ARP's California facility
- See 5,000+ fasteners kits online or request a printed catalog

ARP
automotive *Racing* products

800-826-3045

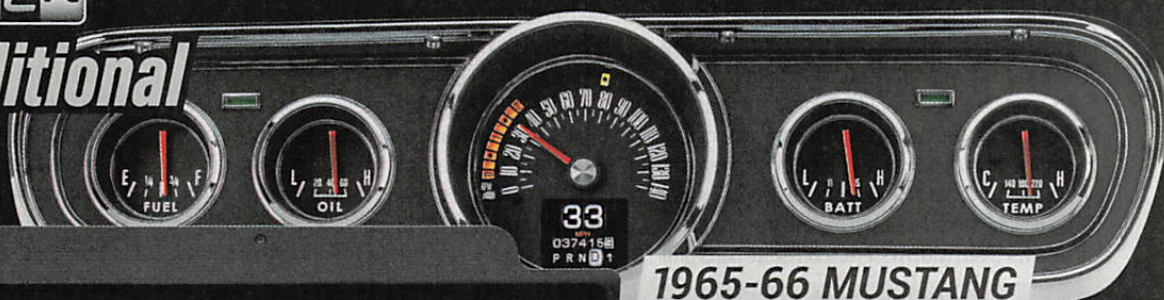
www.arp-bolts.com

FREE!



Retrotech

The new traditional



1965-66 MUSTANG



1970-72 MALIBU



App for Configuration



Selectable Colors

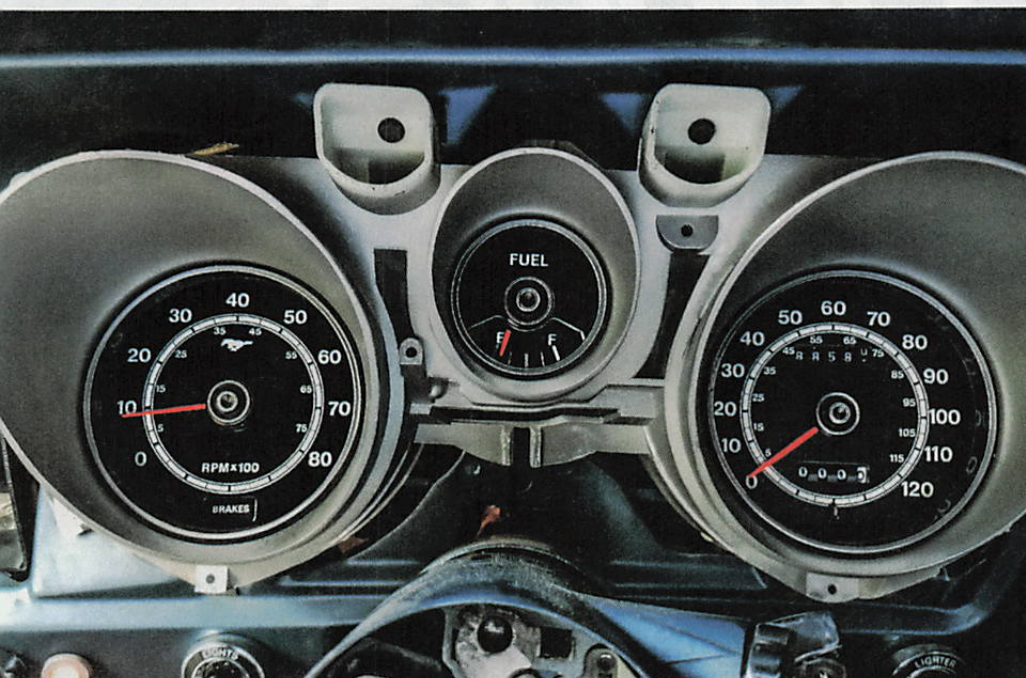


Entry Screen Odometer



CALL TOLL FREE 1.888.200.9984

WWW.DAKOTADIGITAL.COM/HR



New Life for Old Gauges

How Redline Gauge Works Updates Old Factory Gauges to Work with Modern Electrical Accessories While Retaining Their Original Appearance Marlan Davis Marlan Davis and Mark Sanchez

Do you have a problem with the 60-year-old gauges in your classic muscle car? After over a half-century of faithful service, they may have finally bitten the dust. But it might be that new high-output alternator you installed is just too much for the old ammeter. Or that old factory tachometer that worked with a stock points ignition can't cut it with an electronic ignition system, especially if driven by a CD or multispark ignition box that always needs a full 12 volts. Then there's that late-model transmission that has no provisions for hooking up a cable-driven speedometer.

All too often legacy factory instrumentation just doesn't play well with modern upgrades. Replacing them with aftermarket instrumentation is one possible solution, but some hot rodders want to preserve the classic dash appearance in these increasingly rare and expensive cars. If you're one of those people, it's possible to give old factory gauges a new life: Keep their original stock faces, but replace the internals that drive them with modern, solid-state parts and

stepper motors that offer broad compatibility with late-model modifications with greater reliability and accuracy.

Redline Gauge Works is one shop that specializes in gauge upgrades and conversions. Owner Shannon Hudson started working in the instrument-repair business at North Hollywood Speedometer back in 1988 when he was just 18 years old; so yeah, he knows just about everything there is to know about giving

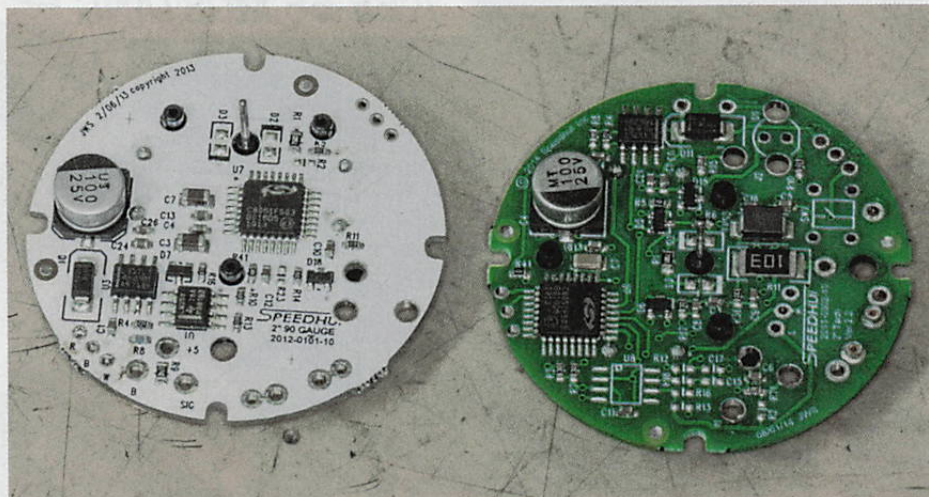
What appears to be a stock 1973 Mustang tachometer really retains only its original face. What you can't see is a new digital microprocessor and stepper motor that (unlike its old analog guts) is correct at any rpm, and fully compatible with today's ignition systems.

old gauges the gift of new life. Redline works on just about any instrument out of stock, custom, or modified domestic and European car models from the late 1920s through the mid-1980s. Capabilities include Concours quality restoration of original instrument panels to complete modernization services for compatibility with late-model parts, up to and including LS, Coyote, or Gen III retrofits with proper coil-ignition, computer, and CAN-bus interface. More common upgrades include tachometer conversions to make old tachs work with aftermarket ignitions, converting mechanical speedometers to work off a modern transmission's VSS output or a GPS satellite signal, ammeter to voltmeter conversions, or even updating that old, inaccurate electro-mechanical clock to modern quartz movement. Redline uses Speedhut digital microprocessor circuit boards and high-torque stepper motors for its legacy factory conversions. Speedhut itself manufactures its own complete high-tech gauges, tachometers, and speedometers, but doesn't upgrade original factory instrumentation.

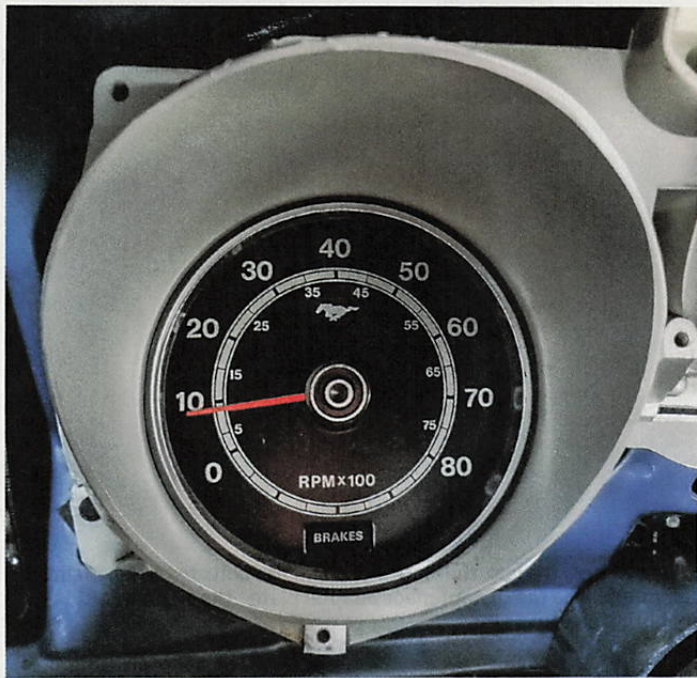
As it turns out, Redline's reanimation services were just what the doctor ordered for rectifying some gauge issues in Don Hicks' 351 Cleveland powered 1973 Mustang. Regular readers may remember our rescue of this car that originally came in with camshaft, cylinder-head, and valvetrain issues. For those who don't, see: "Real-World Repair, Part 1" (Mar '20); "Real-World Repair, Part 2" (May '20); and "Real-World Repair, Part 3" (July '20).

Today, this car runs great. Nevertheless, it still had issues with two gauges not related to the original engine problem: The factory tach refused to function with an MSD stand-alone distributor, and the ammeter pegged the high end of the scale on the face after Hicks installed a modern, high-output alternator.

Mark Sanchez at Advanced Engineering West pulled the instrument clusters out of the car and sent them to Redline. We followed along during the conversion and found the process is sort of like fixing an old watch—when watches still had moving parts and were still worth fixing. Like one of those old analog watches, a gauge's internal parts are tiny and require a jeweler's touch. Think of it like plastic surgery—in reverse: Same face, but with new internal organs. We were super-impressed how Redline's crew improvises and fabricates parts to mate new tech with old-school faces from scratch (and without scratching the faces), then meticulously calibrates them for accuracy. Fully assembled, the master craftsmanship that goes into the product isn't visible—and that's the intended goal: a part that appears just like the factory built it. Let's take a closer look at what's involved in modernizing a tachometer for modern ignition system compatibility and turning an ammeter into a voltmeter.



Redline replaces the old gauges' mechanical guts that drive the pointers with modern Speedhut circuit board microprocessors and stepper motors. The stepper motor's "secret:" It's variable and infinitely calibratable for spot-on accuracy throughout the pointer's range of movement. The white board works with typical voltmeter, oil pressure, coolant temp, and boost gauges. Tachs use the green board. Other boards are available for speedometer and clock upgrades.



■ **This Redline Gauge Works-upgraded 1973 Mustang tach is not only 100-percent accurate, it now also works with any modern ignition system, even late-model engines like Ford's Coyote family.**

TACH ATTACK

It's a sad truth: Old stock tachs are widely inaccurate, or at best only accurate through just one small area of their range, and that's rarely at max engine rpm—where you want them to be the most accurate! Even if old stock tachs function with a modern ignition or engine conversion, you can't depend on their accuracy.

"Old original muscle car tachs are what I call 'novelty tachs,' mainly present for looks, not function. We turn them into a performance tach that's completely accurate throughout the entire sweep of the pointer."

—Shannon Hudson, Redline Gauge Works

At worst, many old factory tachs don't function at all when hooked to a modern ignition system. Traditional electric tachs translate electrical pulses from the ignition system to display engine rpm. They do this with some combination of resistors and capacitors to "condition" these pulses into a waveform so the tach's internal coil-like mechanism can convert them into electrical movement. The resistors and capacitors may be built into the tach, be incorporated in the wiring harness, assume a discrete ignition coil design with a set resistance value, or utilize some combination of all three methods. If you change the type of ignition system (from breaker points to breakerless, from inductive

discharge to capacitive-discharge, or multispark capacitive discharge), throw in a different ignition coil (with different resistance characteristics), or remove the points' ballast resistor because the new ignition needs full-time 12 volts, the signal amplitude may drop below the OE tach's voltage threshold. Result: The tach behaves erratically, becomes even more inaccurate than it was originally, or just stops working. So-called voltage conditioners or tach filters are available from aftermarket sources to correct the problem, but according to Redline's Hudson while they may get an aftermarket tach up and running (sometimes), they're generally not an effective solution for old-time factory tachs.

Another issue is the tach won't read right after an engine conversion when the number of cylinders changes. For instance, if the car originally had a four-cylinder and you drop in a V8, the tach now reads twice as fast (for example, 6,000 actual engine rpm displays as 12,000 rpm—if the scale goes that high!).

And all of these problems are just on traditional engines that still use a distributor. Late-model engines are distributorless and typically use a camshaft position sensor and engine computer that directly fires multiple coils (aka a "coil-on-plug ignition system"). Distributorless engines don't generate the type of voltage pulses or spikes the old tach wants to see for an input signal. Once again, the tach is DOA.

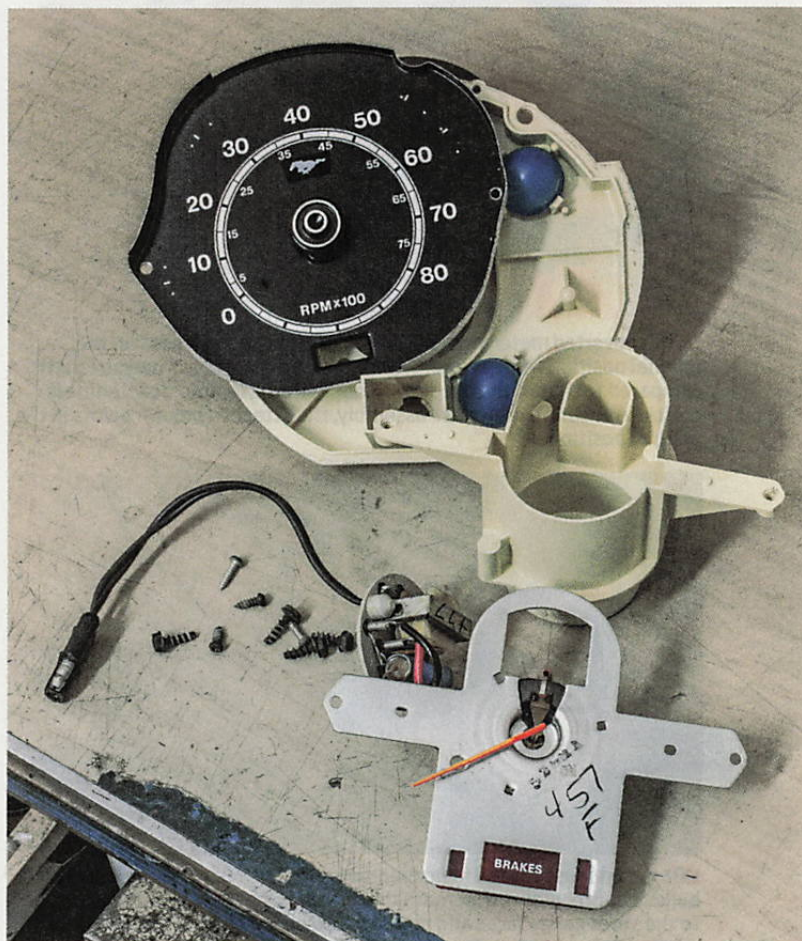
A Ford tach's peculiar problem: The preceding are common generic issues across all manufacturers. However, there's an added wrinkle with legacy Fords. On most factory and aftermarket tachometers, the signal wire connects to the negative (-) side of the ignition coil. But most Fords with points-triggered ignition systems have a two-wire inductive tach that connects to the coil's positive (+) terminal, piggybacking onto the ignition "run" circuit from the ignition switch to coil (+). Remember, on a points system, that circuit incorporates a ballast resistance wire. Upgrading to a modern ignition requiring full-time 12 volts necessitates getting rid of the resistance wire. Without resistance in the circuit, that old Ford tach won't work!

Built for failure: This Ford design remains problematic even if the ignition system is still stock, particularly as originally designed back in the 1960s: The OE Ford tach wire is inline (in-series) with the ignition "run" circuit. In other words, the ignition switch's "run" wire passes through the tach and then on to coil (+). If the original tach ever shorts out, the car won't start—total electrical failure. By 1973, Ford marginally improved this circuit, with the tach now wired in parallel (not directly in-line, there's an added "bypass" wire around the tach). At least in theory the car should still run if the tach shorts out. Wanna bet your engine on it?

Incidentally, if you ever connect the stock Ford two-wire tach to coil (-) by mistake, that error will fry the tach for sure. Any way you slice it, updating the Ford design is a critical reliability and safety fix.

The solution that deals with all these issues: Redline's Speedhut-based SmartPulse™ technology that combines hardware and software filtering to sample the tach signal over 100,000 times a second. The gauge microprocessor determines how much dynamic filtering to apply for a given tach signal. It can work with rpm signals ranging from 1 volt to 600 volts in amplitude. Sine wave, pulse waves, square waves, it doesn't care. Early-type legacy ignition, it doesn't care. Coil-on-plug, it doesn't care. The digital stepper-motor precisely controls pointer movement for 100-percent accuracy throughout the range of sweep.

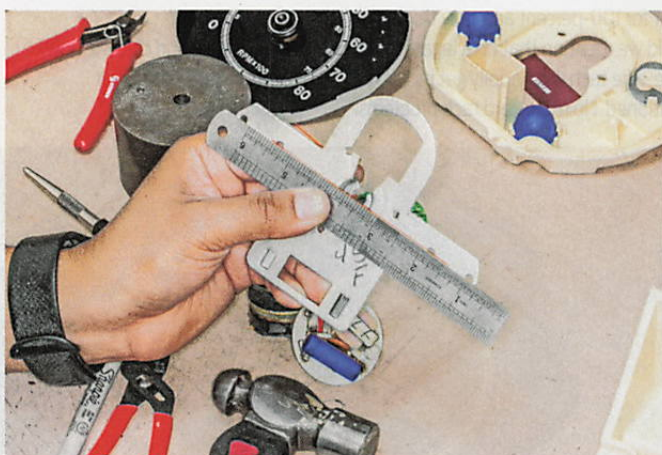
Did we mention that on a legacy system with a distributor and coil, the now-three-wire tach will happily get its trigger signal from coil (-)? Consider it mentioned. No more Ford tach problems.



■ **Tach modernization begins by separating the main components on the bench.**



■ A punch breaks apart the OE epoxy bond used to attach the original central meter mechanism with its internal magnets and coil from the support plate.



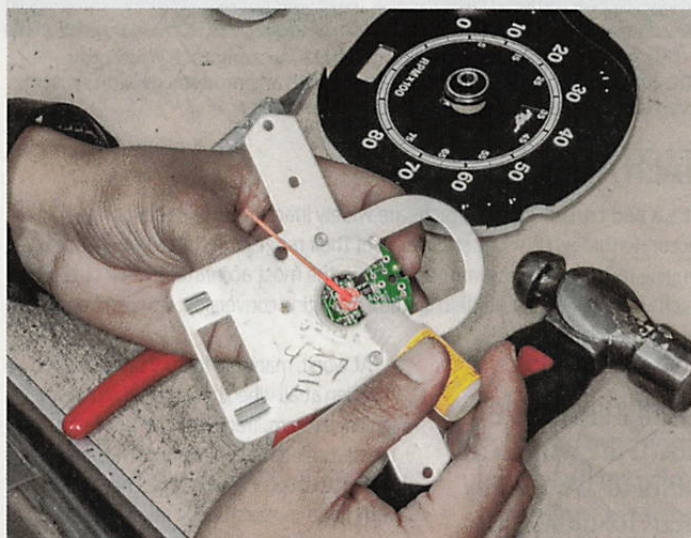
■ The converted meter must be able to fit into the stock bezel in the original position while accounting for the new assembly's overall length compared to that of the old parts. Finding the baseplate's centerline is critical in ensuring that, post-assembly, the attached pointer pivots in the original position.



■ Based on these careful measurements, Redline tech Andy Ceron scratch builds adapter plates that mate the new circuit board and stepper motor to the stock gauge faces and mounts. "We've done thousands of these," relates Hudson. "After figuring out all the measurements and how to mount the new parts, Andy can cut out the plate."



■ Viewed from the rear, the black stepper motor bolts to the green circuit board, and—via the custom-made adapter plate—the original Ford mounting plate.

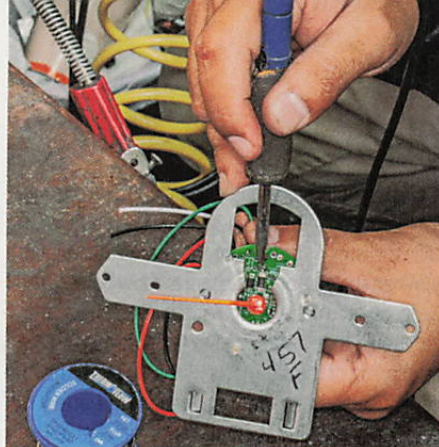


■ Ceron carefully removes the original Ford pointer and using a cyanoacrylate-based quick-drying adhesive bonds it to Speedhut's pointer hub trimmed to fit the original gauge face's center hole.

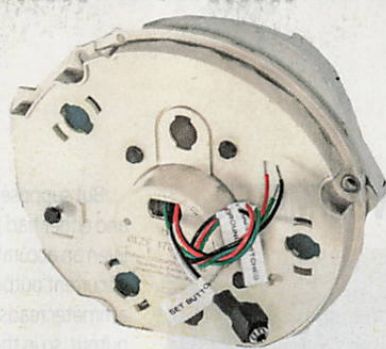


■ After bonding is complete, Redline pulls the newly mated pointer and hub from the assembly mock-up. After stripping, it's carefully repainted to appear brand-new using three separate color-correct Krylon paints: a first coat of flat white primer, followed by fluorescent red/orange, and finally topped with an antifade, UV-resistant overcoat.





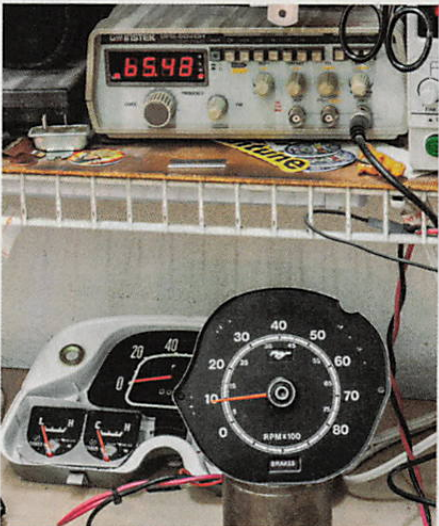
■ After painting and reassembly, Ceron solders new power, ground, and trigger wires to the circuit board.



■ The now three-wire tach ships with instructions for most wiring scenarios and prelabeled wires: Red is power; black, ground; and green, the trigger that runs to coil (-). The separate wire with a set button on one end and an RCA-jack on the other plugs into the square receptacle on the thick black wire; it permits the end-user to switch function for use with other ignition types or a change in the number of cylinders without needing a PC.



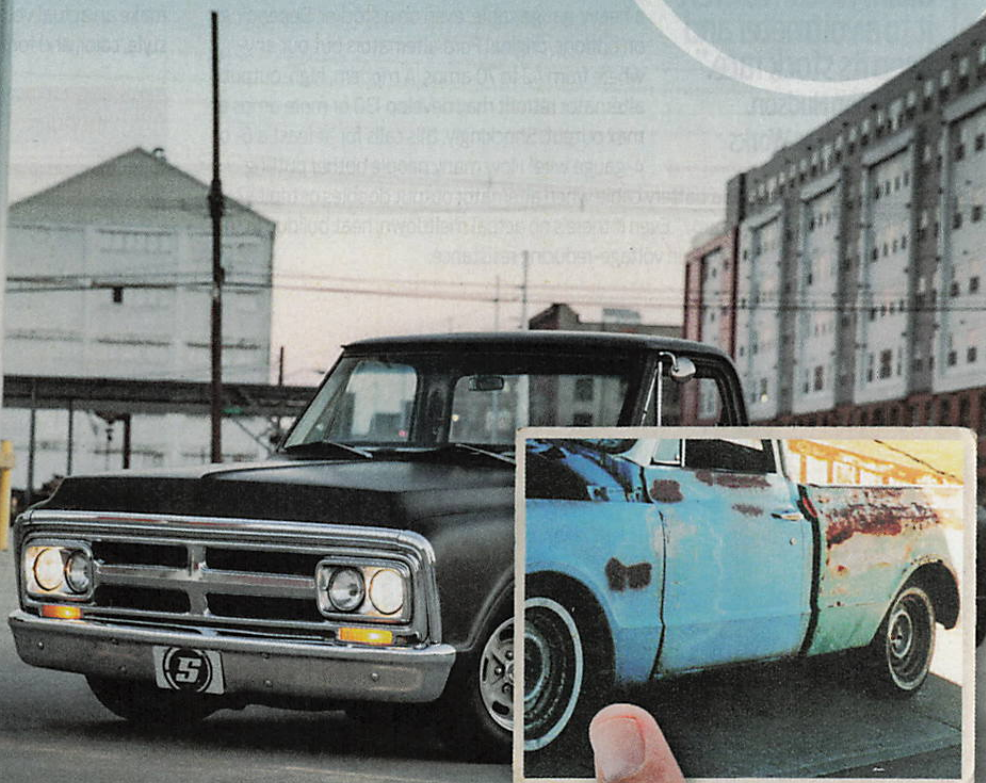
■ Redline programs the tach using proprietary Speedhut software. For a tach, the software allows scaling pointer movement for the face size and total amount of sweep, as well as adjusting for voltage, analog or CAN signal type, ignition characteristics, and the number of cylinders. The same software allows programming most other automotive gauges and instruments that use Speedhut internals. (No, the program is not for sale.)



■ A function generator with a 12-volt power supply bench-tests the finished tach conversion through its full range. At 1,000 rpm here, the reading is 65.48 Hertz; 66 Hertz exactly equals 1,000 rpm on an eight-cylinder engine. Adjusting the fine-tune potentiometer in the microprocessor could get it to exactly 66, but Hudson says, "The difference is not even visible because any change is smaller than the pointer thickness."

855.313.9173 | SpeedwayMotors.com/moments

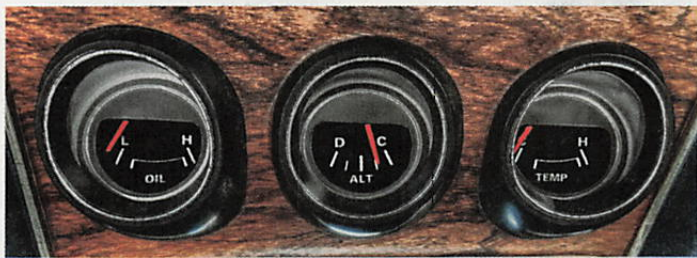
SPEEDWAY motors®



**BEFORE. AFTER.
EVERYWHERE
IN-BETWEEN.**

Every Mile. Every Moment.
Every Memory.

CHARGING AHEAD: AMMETER TO VOLTMETER



■ After a high-amp alternator swap on a 1973 Mustang, its OE ammeter wouldn't read right. The owner wanted to keep the ammeter's original appearance but have Redline convert it to a voltmeter. After first fire-up, it's correctly showing the battery charging at 14 volts (the first tick mark right of center).

Ammeters may have had a purpose in the ancient days with an old-school generator, but they are marginal if running even a first-generation alternator, and totally untenable with a modern, high-output alternator. Think of an

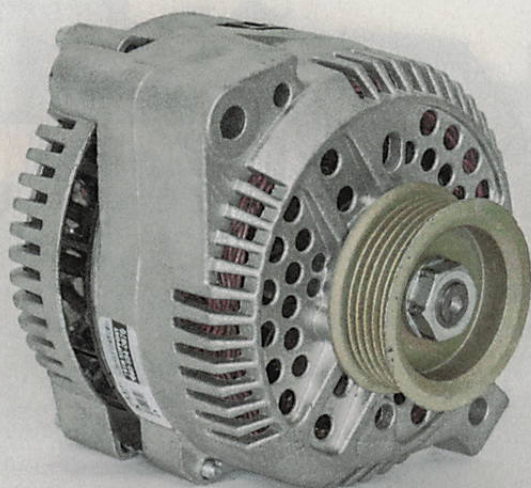
ammeter as a flow meter that, in theory, measures current flow to the battery under normal charging-system operation or discharge from the battery in case of alternator failure. To do this, most Chrysler and Ford ammeters route full alternator current through the dash to and from the ammeter. (The exception is many GM electrical systems that at least had a calibrated length of bypass wire that served as a shunt with a set resistance value.)

Running full alternator output through the instrument panel in the passenger compartment requires a heavy-gauge cable, even on a stocker. Depending on options, original Ford alternators put out anywhere from 42 to 70 amps. A modern, high-output alternator retrofit may develop 130 or more amps at max output. Shockingly, this calls for at least a 6- or 4-gauge wire! How many people bother putting

in what amounts to a battery cable when alternator output doubles or triples? Can you say "fire hazard?" Even if there's no actual meltdown, heat buildup in the undersized circuit results in voltage-reducing resistance.

"Original ammeters will be out of scale with a modern high-output alternator. It's also not a good idea to route so much high current through the dash. We can convert it to a voltmeter and keep its stock face."

—Shannon Hudson, Redline Gauge Works



■ Wide availability, high output, and robust durability make the Ford Motorcraft 3G integrally-regulated alternator the easiest and best choice for replacing old, low-output Ford 1G externally-regulated alternators on amped-up muscle cars, as well as later Fords, including 1980s through early 1990s Fox-bodies.

With a high-output alternator, the ammeter always reads high, and its guts won't handle that much output forever. If the wiring doesn't fail first, the unit itself eventually burns up. An ammeter must have a current rating that exceeds the alternator's maximum rated output. And do you really want 140 amps flowing past your legs?

But suppose you're a diehard and spent the time and effort upgrading the wires and either had the ammeter recalibrated or added a GM-style calibrated shunt. Even an accurate ammeter is still a trickster. At best, it only measures the amount of current output to the battery: When the alternator recharges a low battery, the ammeter reads high. Once fully charged, the voltage regulator reduces alternator output, so in theory the ammeter should then display a low charging rate. But what if the alternator drivebelt is slipping or the alternator itself is failing? The ammeter still reads normal (fully charged battery) until just before the battery fully discharges—when it's too late to do anything about it. Conversely, if the voltage regulator goes, the meter may show a medium charge rate, when what's really happening is the voltage regulator is overcharging the battery.

Going to a voltmeter clears up all this confusion. Think of a voltmeter like an oil pressure gauge, but for the electrical system. Oil pressure (in the U.S.) is measured in psi; electrical pressure is measured in volts. You wouldn't want to route all your engine's oil pressure through the gauge in your dash, would you? Just like an oil pressure gauge taps into an engine's oil-supply passages without restricting them, a voltmeter taps into the electrical system without becoming a bottleneck. It's an observer, not a participant; it doesn't care if an alternator retrofit puts out much higher amps; installation is safe and easy.

In terms of usefulness, unlike an ammeter, a voltmeter directly measures charging-system performance. It tells you the electrical system's real-time voltage: If voltage starts to drop, the alternator is failing; if it's constantly above normal, either there's a voltage regulator issue or the battery itself is going away. But if you pay attention, there's advanced warning!

OK, we've convinced you to "go voltmeter," but you still want to keep that classic dash's original appearance. Redline to the rescue, again, melding old face with new digital parts. Hudson explains, "We leave the face looking the same style as old. The stock Ford ammeter has no actual numbers on it, so we just calibrate the gauge to read accurately with the existing face. Or, for an extra charge, we can make an actual voltmeter face with values and printing that match the original style, color, and fonts of the other stock gauges."



■ Redline starts by separating the 1973 Mustang's three-gauge cluster into its major components: the gauges themselves, the bezel, and the panel. In this case, the car owner just wanted the "ALT" gauge (ammeter) turned into a voltmeter.



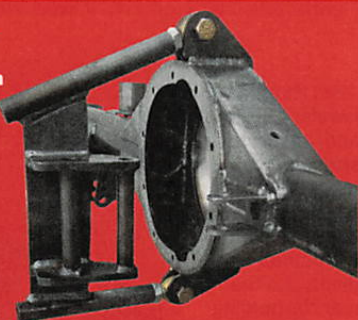
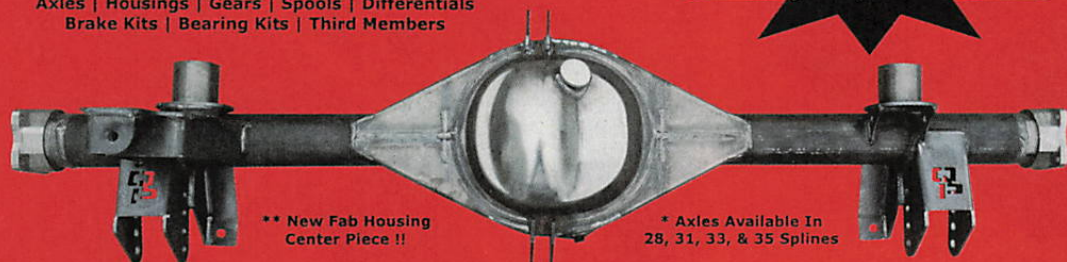
Since 1986

303 Sondrol Ave.
Ames, IA 50010

* Adjustable
Tubular
Torque Arm
Bracket

\$1095

Axles | Housings | Gears | Spools | Differentials
Brake Kits | Bearing Kits | Third Members



* Fits: 1982 - 1992
& 1993 - 2002
F-Body Camaros &
Firebirds

9" Ford F-Body Fab Housing / Axle Package

Complete with Moser Axles, Axle Bearings, Wheel Studs, & Retainers. Includes New Fab Housing Center, Billet Steel Housing Ends, Adjustable Lower Control Arm Brackets, Tubular Torque Arm Bracket, and Drain & Fill Plug



Many Other
Housing / Axle
Packages
Available!!!

9" Ford Center Sections / Third Members

Available with Nodular Iron or Aluminum Case, Daytona Pinion Support, Billet Yoke, Performance Gears (Choice of Ratio), Spool/ Posi / Locker, & Timken USA Bearings

Starting at
\$990

CALL: 515-232-0126

www.quickperformance.com



HOT ROD DRAG WEEK TWENTY TWENTY

SEPT. 13, 2020: U.S. 131 MOTORSPORTS PARK; MARTIN, MI (TECH AND REGISTRATION DAY)

SEPT. 14, 2020: U.S. 131 MOTORSPORTS PARK; MARTIN, MI (RACE DAY 1)

SEPT. 15, 2020: NATIONAL TRAIL RACEWAY; HEBRON, OH (RACE DAY 2)

SEPT. 16, 2020: LUCAS OIL RACEWAY; INDIANAPOLIS, IN (RACE DAY 3)

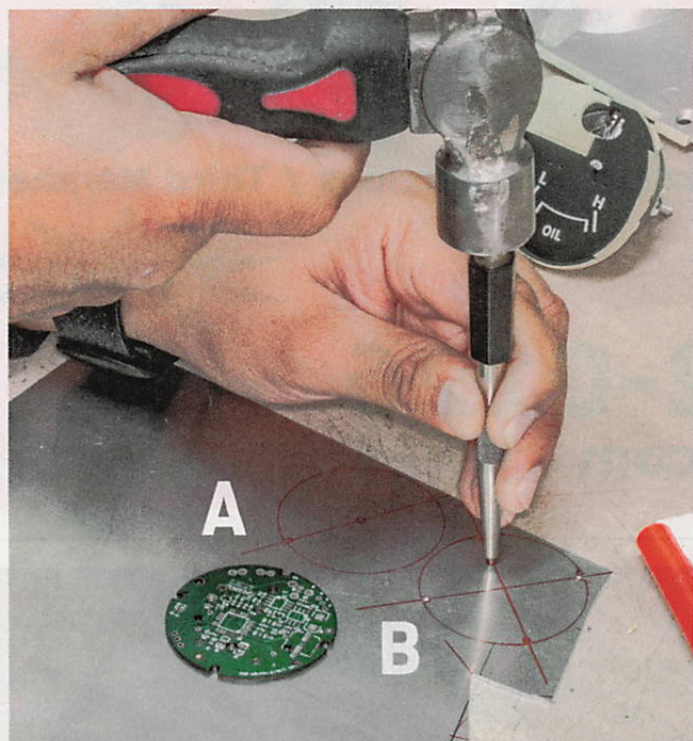
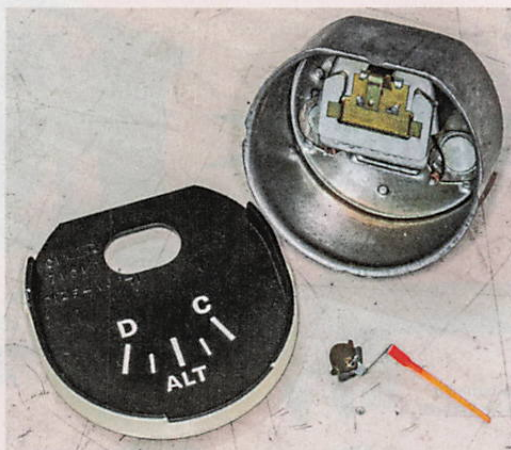
SEPT. 17, 2020: BYRON DRAGWAY; BYRON, IL (RACE DAY 4)

SEPT. 18, 2020: U.S. 131 MOTORSPORTS PARK; MARTIN, MI (RACE DAY 5, FINALS DAY)

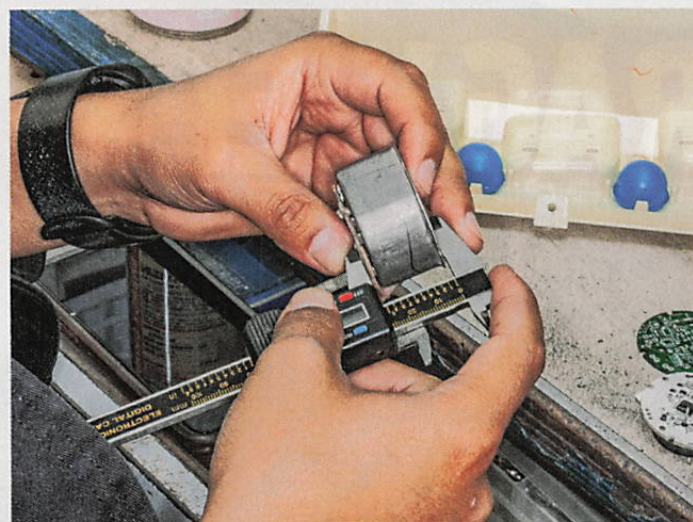
VISIT HOTROD.COM/EVENTS/DRAG-WEEK FOR EVENT DETAILS.



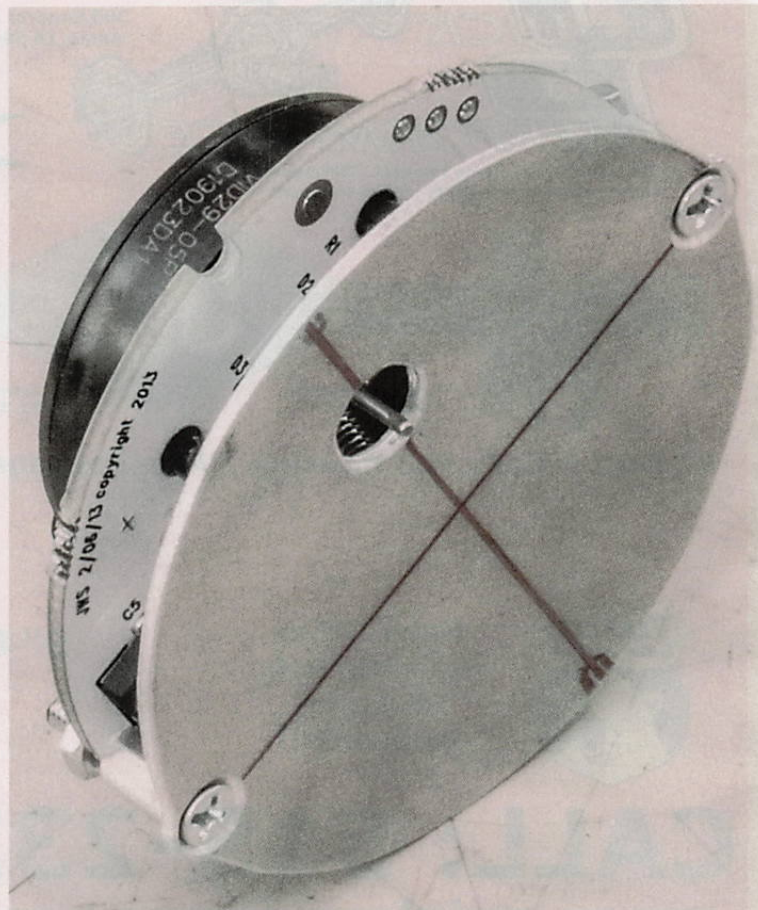
Get those jeweler's picks and miniature screwdrivers ready! Ceron separates the ammeter's face, the pointer and pivot, and the rear cup holding the old analog ammeter mechanism. Wave goodbye to the cup; it's no longer needed.



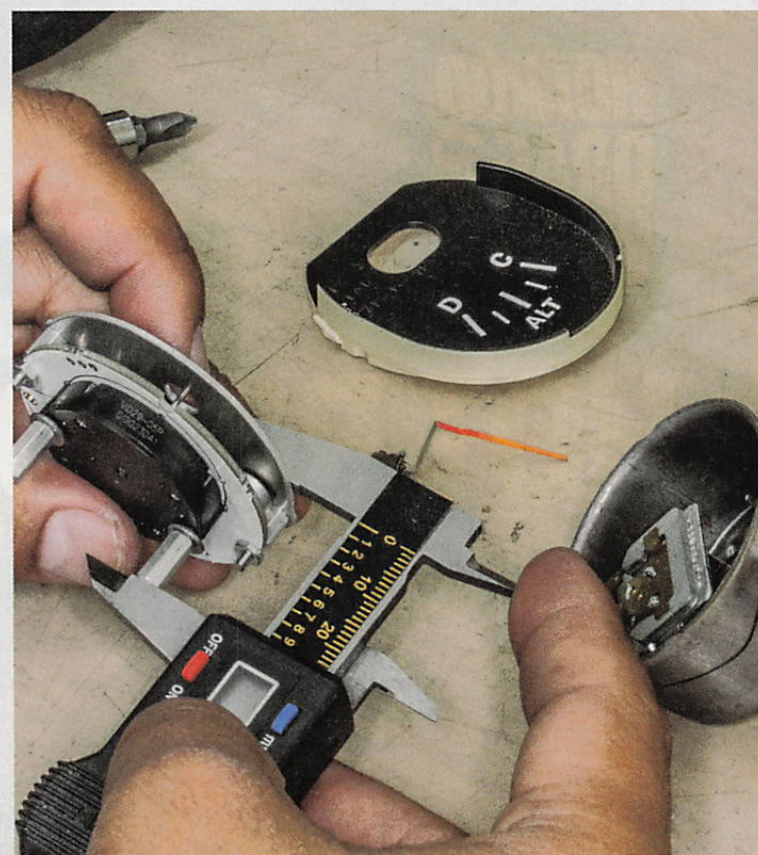
Time to scribe the dimensions for the custom gauge-face mounting plate. Redline makes its plates from 16-gauge (about 0.052-inch) aluminum plate. The green circuit board here is the one used on the tach, which corresponds to circle "A." The ammeter support board mounts to circle "B." The subtle difference is the location of the punched pivot-hole for the pointer: The tach pointer pivots around the circle's exact center; the voltmeter's pointer pivot is offset toward the top.



After conversion, the gauge must end up positioned at the original depth and location within the bezel and cluster. Here, Ceron measure the cup thickness to establish the required standoff length needed to achieve this.



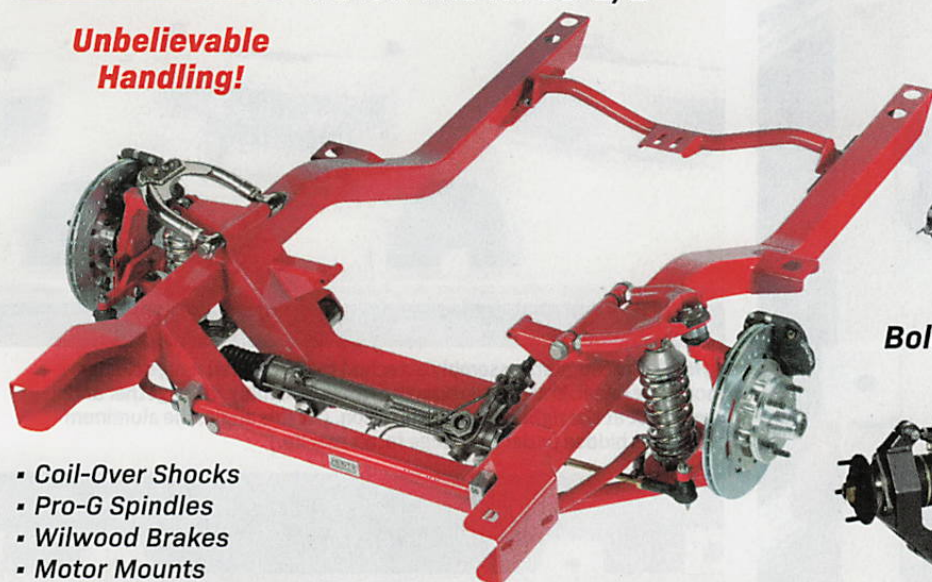
Ceron assembles the newly-machined adapter, short standoffs for circuit board clearance, the circuit board itself, and the stepper motor. This view is from the front (face) side, looking toward the rear. The large hole is for the pointer, which swings from the top down; that's why the adapter plate's hole is offset.



After measuring the new assembly's overall thickness, Ceron adds the appropriate-length rear standoffs to take up the remaining thickness difference between the new assembly and the old gauge cup.

PRO-G[®] IFS 1967-69; 1970-81 CAMARO TRACK WIDTH 58-1/2"

**Unbelievable
Handling!**



- Coil-Over Shocks
- Pro-G Spindles
- Wilwood Brakes
- Motor Mounts
- Power Rack & Pinion

©2020 HEIDTS Products are painted for advertising purposes only

Bolt-In Independent Rear Suspension



1967-69; 1970-81
Camaro

Bolt-In Rear 4-Link Kits



*Shown Painted
1967-69; 1970-81 Camaro

Most popular items ship within 24 hours! Call or Click for your FREE HEIDTS Catalog!

heidts.com | 800-841-8188 | 800 Oakwood Rd, Lake Zurich, IL 60047



Let's Go Cruisin'!



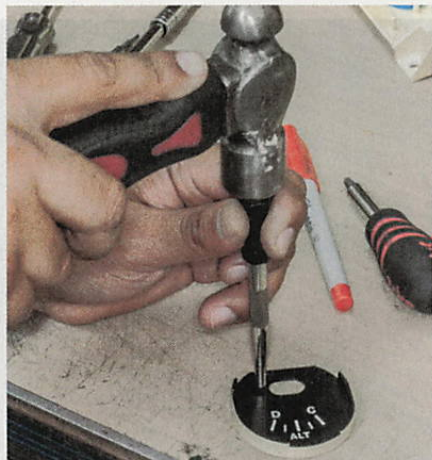
Join us on the Mississippi Gulf Coast, Oct. 4-11, 2020 for
America's Largest Block Party with cruise-ins, headline bands
& oldies entertainment, Vicari Auction's CTC Swap Meet,
the CTC/Vicari Auto Auction and more!

Book your rooms through MS Gulf Coast
Hotel Reservations at 1-888-388-1006.

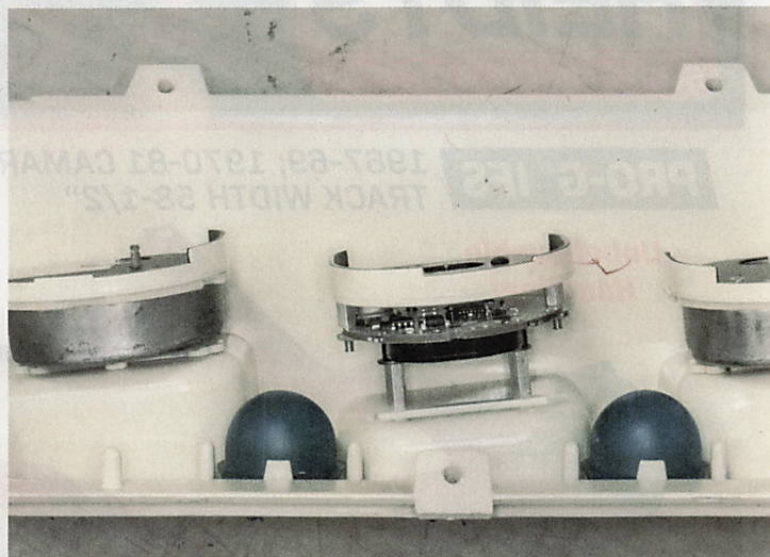




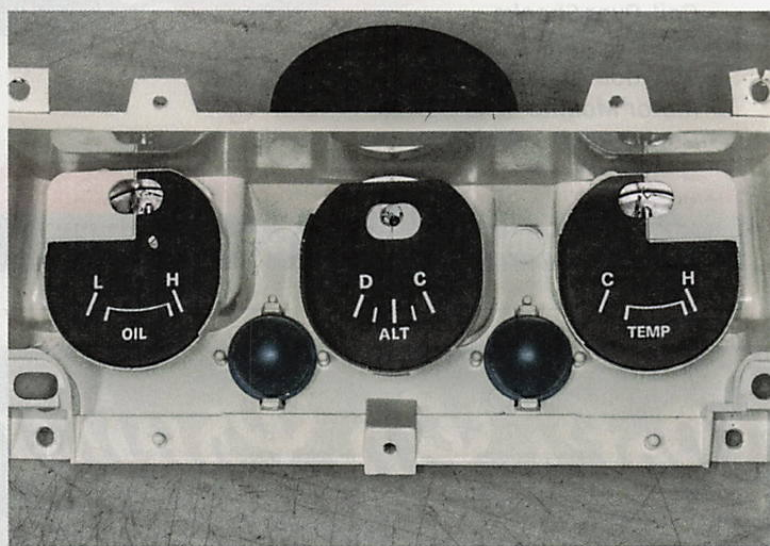
■ Redline drills new holes in the original plastic mounting plate/housing to properly position the stepper motor and the rear pair of standoffs.



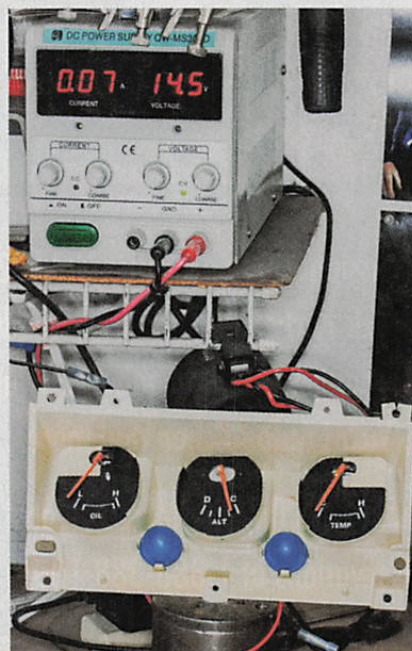
■ Ceron locates new holes in the gauge face (left), then drills the face to mate it to the newly cut aluminum spacer/adaptor plate (below).



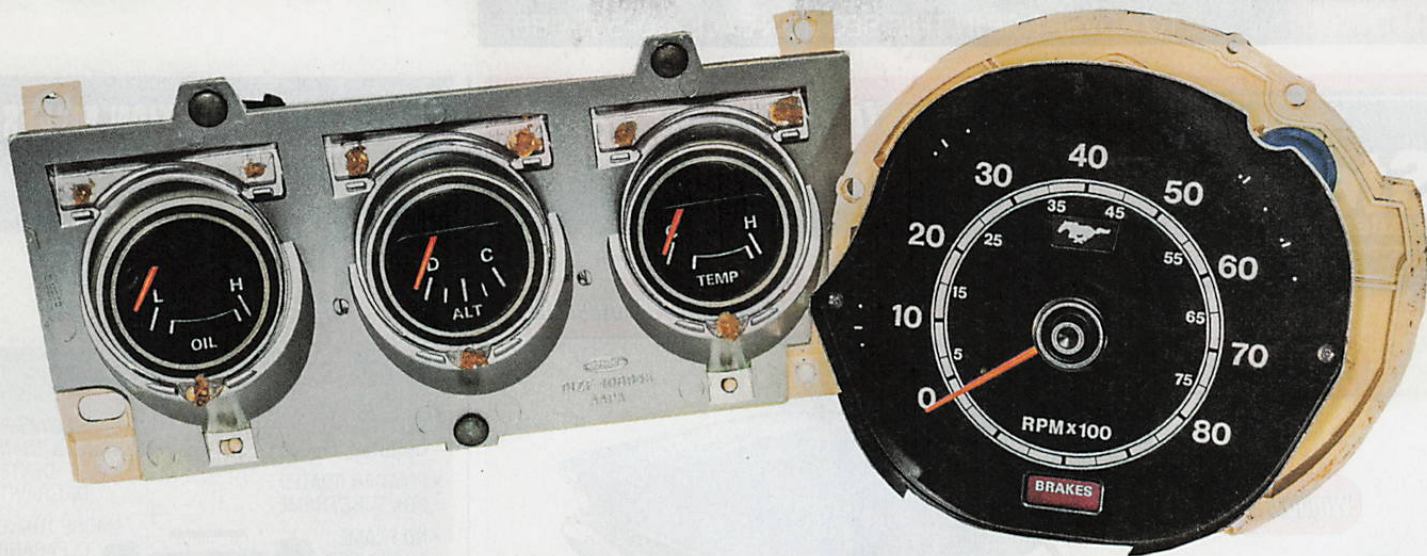
■ Here's the complete assembly attached to the original gauge cluster mounting panel. You can see how the whole assembly fits together and comes out at the right depth and location. (At this angle, the aluminum adapter is hidden under the gauge face's rear lip.)



■ Eyes on, you can't tell the difference between old and new. The new face attaching holes or aluminum adapter won't be visible as they will be covered by the original front bezel. All that remains before final calibration is refurbishing and attaching the pointer.



■ After programming for the correct pointer sweep and proper scaling, Redline uses an AC/DC inverter to test it for accuracy. "There are five tick marks on the original ammeter face that now functions as an alternator," explains Hudson. "The center tick equals 12 volts (battery power, key on), the first tick to the right of center is 14 volts, and the furthest to the right is 16 volts. The first tick to the left of center is 10 volts, the furthest to the left is 8 volts."



■ Redline Gauge Works specializes in upgrading and refurbishing old factory instruments to work with modern accessories. Here, it converted a 1973 Mustang ammeter to a voltmeter. The legacy Ford tach wouldn't work with a modern MSD distributor—until Redline applied their modern digital stepper-motor magic.

BUT HOW MUCH DOES IT COST?

As you've just seen, upgrading and modernizing old gauges is a labor-intensive process, a shotgun marriage melding new digital parts with the original pointer and face mechanism, then ensuring that it fits exactly in the original instrument-panel bezel. Redline generally gets \$320 for upgrading legacy tachometers with digital internals that work with modern ignition systems. The usual fix for taking old ammeters and converting them to better-performing voltmeters goes for \$280, while leaving the face original. If the owner wants the faces restored or altered, that runs around \$500 for a "full resto of all gauge faces in the instrument panel." To update a single instrument's face—for example, to alter the printing from an ammeter to a voltmeter or change the tach's scale—costs \$85 above the conversion price for that gauge. Making a new face is, Hudson explained, "a print process like a dry transfer. Simple silkscreens don't work very well if there are any ridges on the face." The artwork will completely match the original style as desired.

Sources

Advanced Engineering West (AEW); Mira Loma, CA; 626.222.4648; AEWperformance@aol.com

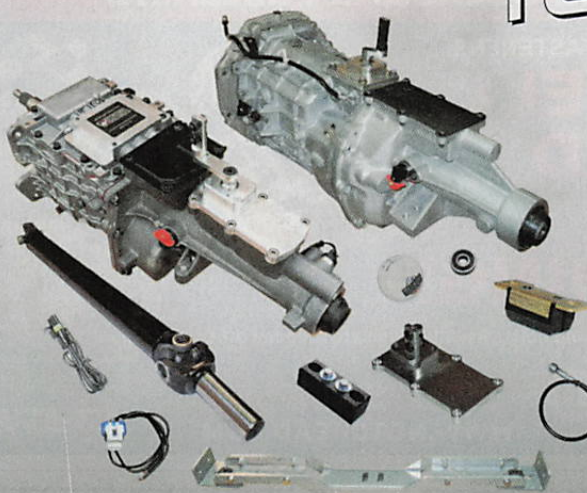
Redline Gauge Works; Santa Clarita, CA; 661.259.8891; redlinegaugeworks.com

Speedhut Inc.; Orem, UT; 801.221.1460; speedhut.com



WHERE IT ALL BEGAN
→ SUBSCRIBE AT
HOTROD.COM

OVERDRIVE it **ALL**



Turn key manual transmission systems for C-10s, Squarebody, GMT400 and F-100 trucks. Fully customized kits built for your project.



Whether you need just a crossmember or complete kit, give us a call!

Proud Distributor of
TREMEC Transmissions!



Follow Us on Social Media!



www.AmericanPowertrain.com 931.646.4836 sales@americanpowertrain.com

Steele
RUBBER PRODUCTS

**Weatherstripping for Cars,
Trucks, Customs & More!**



Get your FREE Vehicle Specific Catalog Today!
www.steelerubber.com **1-800-230-4286**

NotcHead Sockets & Fasteners

WHEN IT COMES TO YOUR FASTENERS...

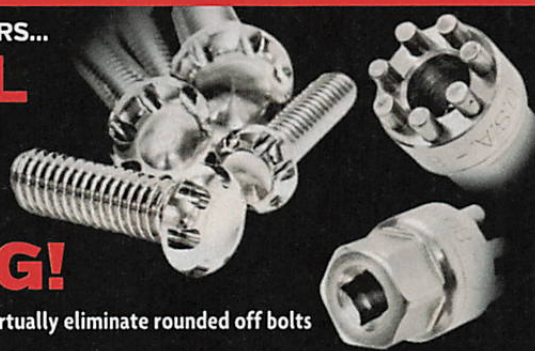
**BEING WELL
ROUNDED
ISN'T A
GOOD THING!**

- NotcHead's proprietary socket and bolts virtually eliminate rounded off bolts

NOTCHEAD
PARTS, TOOLS & ACCESSORIES

(360) 243-3492
WWW.NOTCHEAD.COM

NOTCHEAD IS A DIVISION OF
OSR
OILS, STREET RODS



CUSTOM 6 SPEED



"The Grey Pearl exudes elegance with strength in the drivetrain which is why we chose Gearstar Transmissions." **Ralph Holguin**

NEW!
GEARSTAR
Z6 6L80E

1964 Lincoln Continental
Supercharged Coyote, 6R80 Gearstar Trans



GEARSTAR
PERFORMANCE TRANSMISSIONS

330-434-5216
GEARSTAR.com

**CORVETTE CORRECTION MAKES
CORVETTE PERFECTION**



- KEEP OR SELL ORIGINAL FRAME
- POWDER COATED BOX TUBE FRAME
- NO FRAME 'X' MEMBER
- NO COIL OVERS - WE USE GM SPRINGS
- LOWERED ENGINE & TRANS CENTER OF GRAVITY
- MORE TUNNEL CLEARANCE MEANS COOLER COCKPIT
- REMOVABLE CROSS MEMBER



FRONT & REAR BOLT-ON SUSPENSION & SPRINGS
LESS REAR BODY MOUNT FLEX

CHEVY TRUCK
1947 TO 1972

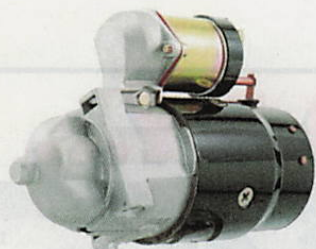
830.305.7496
www.corvettecorrection.com

HOT ROD

**WHERE
IT ALL
BEGAN**

**SUBSCRIBE AT
HOTROD.COM**





✓Yes



✓Yes



xNo



✓Yes



✓Yes



✓Yes

- ✓ Reliably Low Prices
 - ✓ Easy To Use Website
 - ✓ Huge Selection
 - ✓ Fast Shipping
- www.rockauto.com



HOT ROD

DIGITAL EDITION

- » SEARCHABLE CONTENT
- » INSTANT DELIVERY
- » MOBILE LIBRARY
- » VIEW ON ANY DEVICE

ORDER ONLINE:
digital.hotrod-online.com



Sultans Of Spark

S.O.S. Coil On Plug Ignitions
from Davis Unified Ignition
— You CAN Feel the Difference! —

Open up your Plug Gaps to
.065" burning your fuel more
completely.

More voltage under load which
is your "acceleration phase"

Compatible with flash devices
& programmers.

Utilizes superior thermal epoxy
for durability.

LS S.O.S. Coils

Whether you're
running a Vette,
Camaro, or LS Truck
Engine, we have an
S.O.S. Coil for you.
Coils are available in the
triangular, square & round versions.



Ford S.O.S. Coils

For Ford 4.6
and 5.4 V8
owners, the
distress calls for the COP
(Coil on Plug) Ignition Systems
have finally been answered!
Now Available for 2, 3, and
4 Valve Applications.



"In a series of 0-60 mph tests, we
improved our E.T. an average of .84
seconds over a stock ignition system.
On our best test run, we reduced our
0-60 mph an amazing 1.71 seconds!"

Hemi S.O.S. Coils

Late model Dodge and
Chrysler Hemi owners
can now improve
performance by
installing our new
S.O.S.-Sultans of Spark
ignition coils! SOS Coils increase
spark output up to 40,000 volts
- A 50% increase in energy over
the lackluster stock coils.
No gimmicks are used such as
"zero resistance" or tricked out
"rings," just pure hardcore ignition.
Available for both single and dual
tower systems. Ideal for your
Charger, Challenger or Dodge Ram.



2699 Barris Drive - Dept. HR
Memphis, TN 38132
Phone: 901-396-5782
Fax: 901-396-5783
www.PerformanceDistributors.com

**Performance
Distributors**
Send \$4.00 for complete
Catalog and Prices.

BE MOVED BY...

PerformaBuilt Transmissions!

At PerformaBuilt Transmissions our
goal is to engineer and build the
toughest transmissions on the planet.

We don't just rebuild transmissions.
We systematically re-engineer each
model to eliminate OEM flaws and to
achieve the highest levels of performance. That is why we say our
transmissions are "Not just built....They're PerformaBuilt".

All our transmissions include: no core charge, Free shipping and a
warranty up to 2-years.



PerformaBuilt
TRANSMISSIONS

1-888-744-6542

shiftmygears.com

email: info@performabuilt.com

ADHESIVE-BACKED HEAT BARRIER

PROTECT
ALMOST ANY
SURFACE FROM
DAMAGING HEAT

COOL IT.
Thermo Tec



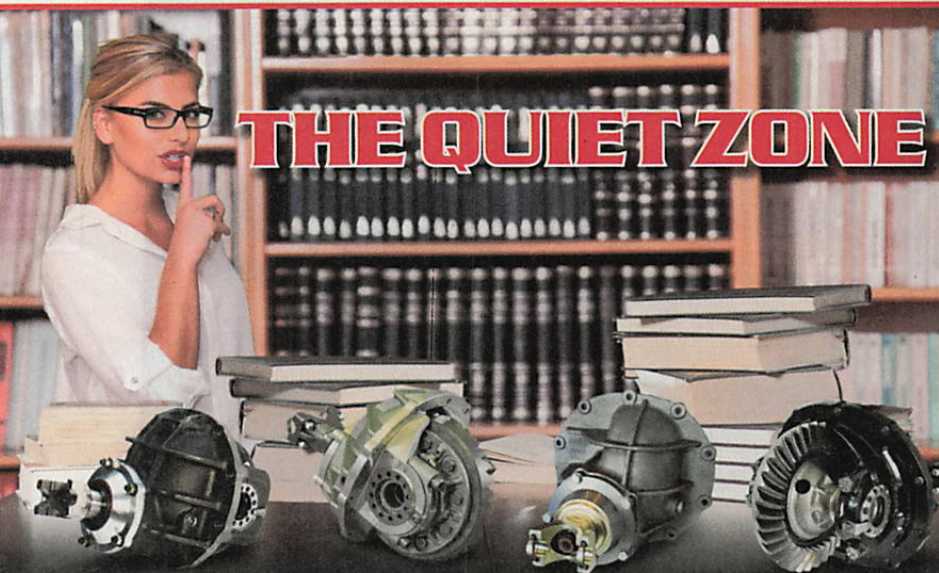
Enter code **HR20** to receive 20% off your order at ThermoTec.com

(800) 274-8437 www.ThermoTec.com

Available at:



THE QUIET ZONE



**JOHN'S
INDUSTRIES**
SATISFACTION BEYOND EXPECTATION

1.800.332.3450
www.johnsindustries.com



2015-2019 DODGE HEMI SUPERCHARGER SYSTEMS

730 HP @ 7 PSI SAFELY FROM
6.4L SYSTEMS ON 91 OCTANE
PUMP GAS

NO STALLS, NO STUMBLING...
JUST SMOOTH, FACTORY-LIKE
DRIVABILITY

CARB APPROVED: E.O.#
D-213-39 50-STATE
EMISSIONS LEGAL
SYSTEMS AVAILABLE

6.4L AND 5.7L CHARGER
& CHALLENGER
SYSTEMS AVAILABLE



30 YEARS OF
LEGENDARY EFFICIENCY,
PERFORMANCE & POWER

BOOST YOUR PERFORMANCE TODAY
805.247.0226 | vortechsuperchargers.com
#POWEREDBYVORTECH

SAFE, SMOOTH, AND 100% LEGAL
HORSEPOWER LIKE NO OTHER KIT AVAILABLE!

VORTECH
SUPERCHARGERS

ORIGINAL PARTS GROUP INCORPORATED

THE AUTHORITY ON
RESTORATION
SINCE 1982



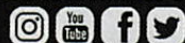
FREE CATALOG!
OPGI.COM | 800.243.8355
**UNBEATABLE QUALITY, PRICE
& IN-STOCK SELECTION**

CORVAIR - BONNEVILLE/CATALINA
PARTS AVAILABLE ONLINE

CHEVELLE - EL CAMINO - MONTE CARLO
CORVAIR - GTO/TEMPEST/LEMANS
GRAND PRIX - BONNEVILLE/CATALINA
CUTLASS / 4-4-2 / F-85
SKYLARK/GS/GSX - RIVIERA - REGAL
T-TYPE/GRAND NATIONAL - CADILLAC



CONNECT WITH US ON



CupFone®

Discover a hands-free,
adjustable phone holder
for your vehicle, ideal for
safe navigation, voice
commands and more

WeatherTech®.com

Auto. Home. Pet. Find Your Fit.

1-800-441-6287 or 1-630-769-1500



Made in USA

© 2020 MacNeil IP LLC

ECONOMY WITH STYLE

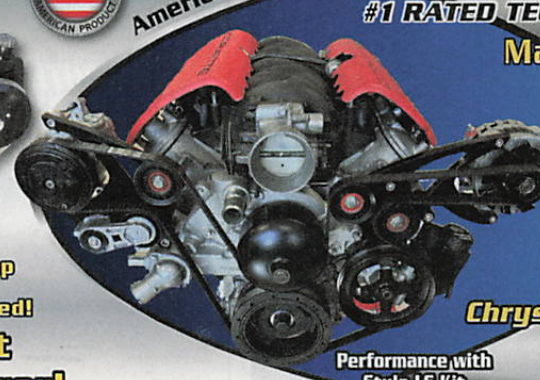



New Long Water Pump
Serpentine
Kits Tensioner Included!

**Starting at
\$545.00 or Lower!**



30 Years Experience
#1 RATED TECH SUPPORT
Maintenance Free Finishes



American Made Billet - Precision CNC Machined

Style TRACK

**Chevy, Ford
Chrysler, Pontiac
Oldsmobile
& Buick**

Performance with
Style LS Kit

MARCH POWDER COATED PULLEYS
Keep the Shine without the Grind
888-729-9070 / marchperformance.com



8055-16

1-800-391-5419

www.woodward-fab.com



FREE
Metal Working
Catalog

**STREET OR STRIP, WE CAN SUIT
YOUR BOWTIE FOR THE OCCASSION**



12-BOLT • DANA • FORD
12-Bolt A, G and F body
'59-70 Impala or CUSTOM
to your specs







For Complete Assemblies: 800-556-8594
For Parts & Service: 866-451-6895
www.drivetrainspecialists.com



Oil leaks?

Your
PCV valve
could be the
problem.
FIND OUT WHY.

M/E WAGNER
PERFORMANCE

Go to: www.mewagner.com
or call 570-899-4544

OVAL TUBING
EXHAUST SYSTEMS

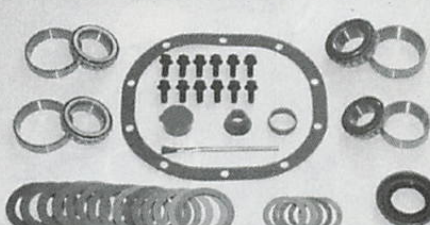
LOW-PROFILE MUFFLERS / X-PIPE KITS
TRANSITIONS / ELBOWS / BENDS



Spin
Tech

888.550.7746
SPINTECHMUFFLERS.COM THE SOUND OF SPEED

DRIVELINE



Bearings, Crush Sleeves,
Solid Spacers, Shims,
Fasteners, Gaskets

Sold as a kit or individual parts

All American models from 1955,
Chrysler, Ford, GM

Ratech

*If it came in the housing from the factory,
it's in our kits.*

For more information or to order
(513) 742-2111 • www.ratechmfg.com
11110 Adwood Drive • Cincinnati, Ohio 45240

CORVETTE CORRECTION MAKES CORVETTE PERFECTION

- KEEP OR SELL ORIGINAL FRAME
- POWDER COATED BOX TUBE FRAME
- NO FRAME "X" MEMBER
- NO COIL OVERS - WE USE GM SPRINGS
- LOWERED ENGINE & TRANS CENTER OF GRAVITY
- MORE TUNNEL CLEARANCE MEANS COOLER COCKPIT
- REMOVABLE CROSS MEMBER



FRONT & REAR BOLT-ON SUSPENSION & SPRINGS
LESS REAR BODY MOUNT FLEX



830.305.7496 • www.corvettecorrection.com

PERMANENT LIFETIME ENLARGEMENT? Liquids Work Faster Than Pills



What a difference 3 inches makes
I'm Brenda, My man takes the Pro-Plus Ultimate. Hear how he satisfies me. (888)242-0469

Liquids absorb 98% and immediately goes into the body's system. Easy to use. Take with or without your favorite beverage.

Dr. Bros advises erection size can be 3 inches bigger and can have enlargement for a lifetime when you continue to take PRO+PLUS LIQUID. Men of any age can achieve the highest success rate in 1 to 2 months. Reach Your Maximum Potential.

Although liquid is shown to work faster than pills, some men prefer pills and PRO+PLUS ULTIMATE PILLS are an excellent alternative.



PRO+PLUS ACCELERATOR LIQUID or CREAM
Customers tell us the Accelerator can speed up the time it takes for male enlargement up to 50%. Easy to use. Works with any Pro-Plus formula. You can feel the benefits immediately.
FREE WITH ONE YEAR SUPPLY OF ANY PRO+PLUS FORMULA



SUPER FORMULAS SPECIAL OFFER
Only \$25.00 Each Or Select **ONE FREE** With Any Pro-Plus Order. Select Any 3 FREE With a One Year Supply of PRO+PLUS.



SEXCITER LIQUID
Excites women better than Spanish fly.

ATTRACT-A-MATE
Human pheromone spray can make women desire you.

For more than 30 years Dr. Bros has satisfied millions of men.
Money Back Guarantee

Call us about our products. We'll give you important information you can trust. Be careful of discounters and imitators that sell the same type of products on Amazon, Ebay and Google. Our products are not authorized to be sold through these companies. Don't buy from sellers who don't disclose where their products are made, use inferior blends and cannot call them.

Credit Card Orders Call Toll Free Anytime • 24/7

1-800-378-4689
Customer Service 1-707-931-1001 Se Habla Español



PRO+PLUS XTREME
For Immediate Erections. Effective Up To 12 Hours.
Preferable alternative to the blue pill.

Mail Payment to:

Avid Pro Medical Dept. 010H5A • Box 6710, Malibu, CA 90264

☐ Check ☐ Money Order ☐ Cash

www.ProPlusMed.com

Pro-Plus Liquid or Pills ☐ Liquid ☐ Pills

Name (Print. I am over 18 and agree to the terms of ProPlusMed.com)

Address / City / State / Zip

Credit Card Number

Expires

CVC Code

PRO+PLUS XTREME			
1 Bottle (5 Capsules)	\$15.00	\$	
1 Bottle 60 Capsules	\$50.00	\$	
PRO+PLUS ACCELERATOR LIQUID	\$25.00	\$	
PRO+PLUS ACCELERATOR CREAM	\$25.00	\$	
SEXCITER LIQUID to Excite Women	\$25.00	\$	
ATTRACT-A-MATE Pheromone to Attract Women	\$25.00	\$	



Original	Advanced	Ultimate
Results in 3-4 months.	Can gain up to 50% in length & width in 2-3 months.	Can gain up to 50% in length & width in 1-2 months.
30 Days plus 30 Days FREE ☐ \$50	☐ \$60 ☐ \$110	☐ \$80 ☐ \$140
60 Days plus 60 Days FREE ☐ \$90	☐ \$170 ☐ \$210	☐ \$240

Shipping, Rush Service and Insurance \$20.00 VALUE ONLY \$14.95

Total Enclosed \$

Individual results may vary. These statements have not been evaluated by the FDA. This product is not intended to diagnose, treat, cure or prevent any disease. V161

YEARONE.com

Restoration & Performance Parts for
GM, Ford & Chrysler Muscle Cars

1-800-932-7663

Visit **YEARONE.com** and
enter code **HOT30**

to get maximum discount on applicable items.

For details please call

1-800-932-7663

LIMITED TIME OFFER

*some restrictions apply | Online Only

SAVE NOW

© 2020 YEARONE

HRO20

LS and LT Conversions

Easy Bolt-in
Swap Kits!

Use Code
MR16P
Online
and save
10%

Everything you
need to install
an LS or LT
based engine.

Designed
and Built in
the USA

770-751-0687 **MuscleRods.com**



**OUR TRANSMISSIONS
ARE NOT JUST
BUILT... THEY'RE
PERFORMABUILT.**

Take your street rod project to the next level with a PermaBuilt transmission. We have a full line of GM and Ford overdrive transmissions to handle up to 1000+ hp as well as the old school 3 speed automatics. Whether you have a cruiser or street/strip performer, we've got you covered.

**CHECK OUT OUR
FULL OFFERING!**

(888) 744-6542

WWW.PERFORMABUILT.COM

MONDELLO

THE WORLD'S LARGEST manufacturer and distributor
of Oldsmobile V8 performance engine parts, 1964 to
1990. Serving the Industry since 1959 with:

- Street, Strip, All Out Competition
- Performance Oldsmobile Engines
- Performance Products & Accessories
- Performance Cylinder Heads - All Engines
- Edelbrock Aluminum Performer RPM Olds Heads
- Custom Flywheels & Flexplates - All Engines
- 96 Page Parts Catalog (\$9.00 U.S.)
- Oldsmobile V8* Technical Reference Manual (\$26 U.S.)



MONDELLO PERFORMANCE PRODUCTS, INC.

1103 Paso Robles St. • Paso Robles, CA 93446

(805) 237-8808 • www.mondellotwister.com

OLDSMOBILE

HOTROD

WHERE IT ALL BEGAN

SUBSCRIBE AT HOTROD.COM



IS "CAR-GUY TV GOOFING JOURNALIST" A JOB?

I still view myself as a gearhead journalist, but the reality is that I'm a TV guy. I've recently found myself rapt with nostalgia for the early-'90s days of being a HOT ROD magazine staffer under the wing of Gray Baskerville, mingling with the pioneers of the industry, hanging out at the Street Machine Nationals in Du Quoin, Illinois, and being part of the founding days of the Fastest Street Car Shootout. My video and TV followers are a younger crowd oblivious to such things. I meet glazed eyes when I discuss my editorial history at HOT ROD, *Hot Rod Deluxe*, *Rod & Custom*, *Car Craft*, and *4-Wheel & Off-Road* magazines.

Inversely, I'm curious if you readers understand what I'm up to. Many don't realize I'm no longer involved in HOT ROD editorial other than this column. That ended three and a half editors ago as I phased out of my magazine Editor-in-Chief role and into the video portion of the business that's ultimately become a division of Discovery—as in Discovery cable TV.

Circa 2011, I was editing both HOT ROD and *Hot Rod Deluxe* and probably overseeing *Car Craft* as well when the company wanted more video on HotRod.com. I began making car-related adventure videos with HRM staffer Mike Finnegan, then YouTube struck a deal with the publishing company to fund the MotorTrend channel, which became the largest auto outlet on YouTube. The Freiburger-and-Finnegan show was named *Roadkill* on the MotorTrend channel and it became YouTube's most viewed car-related show. Eventually the YouTube financing ended, but the massive audience of MotorTrend shows attracted Discovery into a joint venture that led to all the original YouTube shows, plus dozens of other cable-TV car shows, being placed onto the MotorTrend app. The app—available on your computer, mobile devices, or game consoles—lets you subscribe to see shows whenever you want. Also, the Discovery-owned, automotive-centric cable TV channel that was called Velocity is now known as MotorTrend, and my shows sometimes appear there as well. In truth, if you only use your cable box to watch car stuff, you might as well cut the cord and get the MotorTrend app. It's radically cheaper.

I should point out that these business moves are not of my doing. There's persistent belief among the audience that I'm calling the shots and making the deals. Not so. I'm just a producer and host of a number of shows. The main one is *Roadkill*, with no premise other than "we play with cars and you point and laugh." Finnegan and I still co-host, 110-plus episodes later.

I also host *Roadkill Garage* with my friend Steve Dulcich (who is also an occasional guest on *Roadkill*),

where we show you "how to do the wrong thing the right way" as we build fast beaters on Steve's farm.

Engine Masters is my show with hardcore before-and-after testing and analysis of speed parts and performance theory on the engine dyno. This one is co-hosted by Steve Brulé of Westech Performance Group in California, and also by Dulcich, and we have a lot of fun with it.

Another *Roadkill* spinoff is *Roadkill Extra*, a short vlog that's posted every weekday to the MotorTrend app. It has outtakes, tech tips, Q&A sessions, project-car updates, and more.

Finally, I co-host \$3K *Hootie Challenge* with Brian Lohnes, who you may recognize as the lead announcer for NHRA on Fox. This show is about dirt-cheap drag cars and it's hilarious. As for side gigs, you can spot me on *Roadkill's Junkyard Gold* hosted by former HOT ROD staffer Steve Magnante, or on the new *Shift Talkers* panel discussion show, or in the pandemic-driven *Working From Home* show (I have two episodes talking hot rod history as I reveal treasures of my garage).



By David
Freiburger

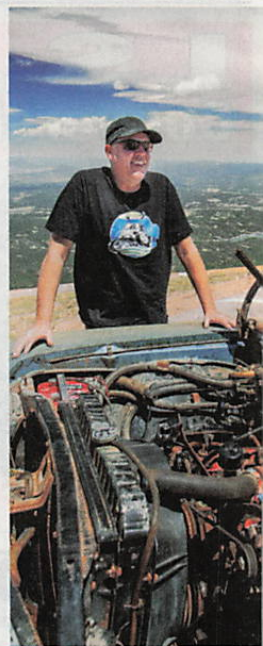
Roadkill
@davidfreiburger



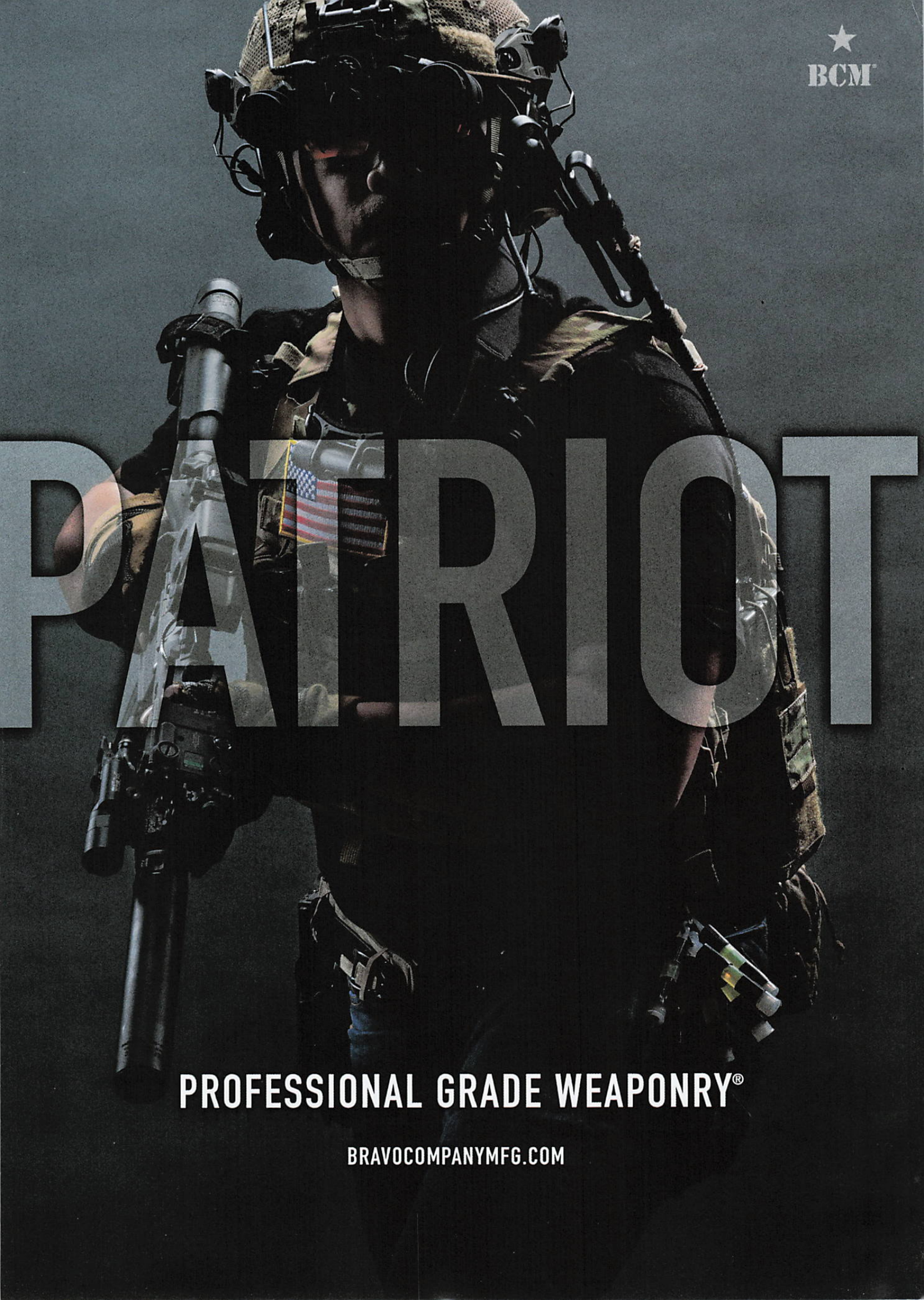
Oh! And the original *Hot Rod TV*—the first hot rodding tv show the magazine launched in the '90s—is also there.

I've abandoned the life of 36-hour days writing my brains out for magazines and jumped into a nonstop schedule of wrenching, building low-buck project cars, road-tripping, and testing engines. We are extremely fortunate that we still don't have any scripts or fake drama, as the hosts are mostly in charge of the content for the shows. We figure if it's fun for us, it's fun for the audience. The most frustrating part is when tight schedules prevent us from finishing cars or meeting goals in the way that I want. Back in my magazine days, if a story plan flopped, I could just stay awake 24 hours and write something to replace it. In video, we have to air all our mistakes. But that's also what many viewers like about it. We don't fake it.

It's hectic, but it's also the car-guy dream job. Nonetheless, I still miss the romance of HOT ROD, and I'm grateful to be able to hand in this column each month.



Follow us
@hotrodmagazine



★
BCM

PATRIOT

PROFESSIONAL GRADE WEAPONRY®

BRAVOCOMPANYMFG.COM



CLASSIC PERFORMANCE

PRODUCTS, INC.

Steering • Brakes • Suspension



Photo Courtesy of Motor Trend



STEERING



MOST POPULAR APPLICATIONS

500 Series™

**400 Series™ & 500 Series™
Power Steering Boxes
& Conversion Kits**



UNIVERSAL SHOWN

**KEY & SHIFT COLUMNS
ALSO AVAILABLE!**

**5-Way Tilt
Steering
Columns**

BRAKES



HydraSTOP

ALL POPULAR APPLICATIONS

**Street Beast™ Hydrastop™
Hydraulic Assist Systems**



EARLY A-F-X BODY
STOCK-HEIGHT



A-F-X BODY
STOCK-HEIGHT

CHEVY TRI-FIVE
2" DROP

G-BODY
STOCK-HEIGHT

EARLY A-F-X BODY
2" DROP

**Stock-Height or 2" Drop
Corvette-Style Spindles**

SUSPENSION



**DUAL
ADJUSTABLE**

*Totally
TUBULAR*

MOST POPULAR APPLICATIONS

**Dual-Adjustable Coil-Over
Conversion Packages**



REAR KIT
SHOWN

**Front & Rear
High-Clearance
Adjustable Sway Bars**

LS & LT ENGINES



**LS/LT Engine Install Kits
Headers and Manifolds**

ALL POPULAR APPLICATIONS



**FIT Rite
LS**

**EXCLUSIVE
LS/LT
Adjustable
Engine
Mounts**



EFI FUEL TANKS



**Classic-Fit EFI
ALL-IN-ONE**

**Complete ALL-IN-ONE OE Style
Fuel-Injection Tank Systems**

ALL POPULAR APPLICATIONS



**Fuel Tank
Accessories
Available!**

- EFI COMPLETE FUEL FILTER/REGULATOR KITS
- EFI FUEL PUMPS
- EFI IN-TANK FUEL PUMP INSTALL KITS
- GAS TANK SENDING UNITS
- EFI FUEL FITTING KITS

• Carbureted Tanks Also Available

888-522-8305



#classicperform

378 E. Orangethorpe Ave. Placentia, CA 92870

CLASSICPERFORM.COM

Prices subject to change without notice. Please note that kits and prices may vary between certain applications.

5% OFF
PROMO CODE: **HRM20**
LIMITED TIME ONLY!
*YOUR TOTAL ORDER ON CPP PRODUCTS ONLY



**NOW AVAILABLE:
NEW CPP CATALOG!
SCAN QR CODE
TO DOWNLOAD!**

